NEBRASKA.

Nebraska, west of the 99th meridian, Wyoming, and the southwest part of Dakota form a continuous stock region characterized by the same general management, the same general climate, common sources of supply, and a common direction for market.

It is but a few years since Nebraska included western Dakota and Wyoming, and it is a still shorter time since Dakota included Wyoming. A brief reference to the early history of the region will suffice for the three, and the description of the management of a herd or a flock in one will apply with modification for local causes in another. For convenience, however, they are treated separately, except that this general historical reference may serve for Wyoming and Dakota, whose grazing regions were once parts of Nebraska.

The first emigrant wagon-train for the Pacific coast crossed the plains in 1836, the famous missionary train (*a*) passing through the present Nebraska and Wyoming nearly on the line of the Union Pacific Railroad, accompanied by cattle. Before that time there were no cattle except a few at traders' posts in all the region under consideration.

After the Mormon emigration of 1847 and the opening of the overland trail consequent upon the California gold excitement in 1849, cattle abandoned on the plains thrived, but they increased slowly even up to 1857.

It is not until 1867 that we find any herds (unless the small bands here and there near a fort or an emigrant trail camp may be so called) held for breeding purposes in the present Wyoming, then a part of Dakota territory. It may be remembered that in 1860 all of the western country beyond the Missouri to the Rocky mountains, and from the 40th parallel on the south to the British possessions on the north, was called Nebraska. Dakota was organized in 1861. Wyoming was organized from Dakota as a territory in 1868. Nebraska became a territory in 1854, and was limited to its present area in 1863. With the building of the Pacific railroad, say between 1865 and 1870, the raising of cattle may be said to have begun as a business along the Platte river and its tributaries; sheep, as a rule, following within two or three years.

In 1867 breeding-herds were held south of Fort Laramie and the North Platte river, in the southeast corner of Wyoming. In 1870 the number of cattle in the region did not exceed 18,000, and of sheep about 10,000. For the whole of Wyoming, Nebraska, and Dakota, the census of 1870 enumerated 485,917 cattle and 88,238 sheep on farms. It is safe to estimate that at that time within all of Wyoming, Nebraska west of the 99th meridian, and in Dakota south of the Big Cheyenne river and west of the Missouri, there were not over 150,000 to 175,000 cattle and 40,000 sheep, while in 1880, in the same part of the country, which may be called the "ranch" regions, and not including eastern Dakota and Nebraska, there were over 1,100,000 cattle and nearly 400,000 sheep. This is not, however, a representation of natural increase, because the herds of 1870 have constantly been enlarged by purchases from the south and west.

PASTURAGE.

We omit eastern or agricultural Nebraska from pasturage consideration. Good pasturage in large bodies exists along parts of the Niobrara river, on the Loup forks, in extensive tracts on the Platte rivers, and through the valleys of the Republican river and its tributaries. In these districts there are but few areas of more than 3 to 5 miles square destitute of some kind of grazing vegetation, and in the winter the melting snow will almost everywhere furnish some water to the herds. Even in the "bad lands" some form of vegetation often covers the hills. At least 40,000 head of cattle were ranged between the 101st and 103d meridians and latitudes 41° 40′ and 42° 30′ during the winter of 1879–'80. Cattle push into this dreary sand-hill country every winter from their summer ranges on the Niobrara and North Platte. Small and large lakes, both alkaline and fresh, are interspersed among the hills. The grasses are mostly coarse bunch, making excellent winter feed. This sandy region extends eastward, diminishing in intensity past the 99th meridian. Flies and mosquitoes and other insects would prevent its occupation in summer, even were not the grasses elsewhere more attractive.

Sioux and Cheyenne counties, comprising the western extremity of Nebraska, form a good grazing section. It contained at midsummer, 1880, 175,000 cattle north of the North Platte. That was believed to be its full stock capacity. The largest herds are northwest of the Niobrara river. Just east of Spoon Hill creek is a poor tract of extreme dryness, about 15 miles square. South of the North Platte, between Pumpkin-Seed and Lodge Pole creeks, the pasturage, originally good, has been seriously impaired by overstocking. On Lodge Pole creek, principally south of it, occurs the only sheep occupation in extreme west Nebraska. North of the Platte, over all the section west of the 101st meridian which is not sand-hills, buffalo-grass constitutes a good proportion of the pasture.

a The missionaries accompanied a train in 1836. The term "missionary train" is also applied sometimes to the train of 1843, under personal lead of the missionary, Dr. Whitman, which, as well as a train in 1842, was accompanied by cattle.

East of the 101st meridian, to about the 99th meridian, pasture is good on the south side of the Niobrara river for 30 miles. In 1880 the ranges were not fully stocked. The southward bottom of the Calamus and the Loups are good grazing grounds. On middle Loup is a strip of farms and ranges. Along the Niobrara river north of latitude 42° 25′ there are from 40 to 60 acres to the head. Below that parallel to 41° 30′ the density of occupation diminishes to over 100 acres to the head. Further south there is a tier of counties with 40 to 60 acres to the head. Over the sections so far considered, on an average latitude of 41° 30′, no sheep were found in 1880. South of latitude 41° 30′, in the great southern bend of the Platte river, lies a good grazing section. The 99th meridian about equally divides it. Population and farming are fast advancing westward and northward, crowding free-ranging herds back. Nevertheless there remained there in 1880, as near as their numbers can be estimated, 93,000 cattle and 38,000 sheep, the latter principally in the southeastern portion.

All the Platte valley, from Kearney westward, within ten miles of its tributaries and the Pole creek borders, are good natural ranges. Railroad conveniences have induced overstocking. Farmers and sheepmen, under the pre-emption or homestead acts, or by purchase, control the available watering-places.

There are two dangers, somewhat peculiar to the Platte ranges of central Nebraska, and especially noticeable in the Republican valley southwest—miring and drowning. There are hollows and stream-beds of tenacious or shifting soil that become dangerous traps after the spring and early rains, particularly for young stock. When the floods break into the narrow valley ravines, numerous in those regions, there are sometimes heavy losses by drowning, the animals being caught by the flood of sudden storms. Along the Republican river farming is increasing.

Twenty-eight per cent. of the cattle of Harlan, Furnas, Red Willow, Frontier, and Hitchcock counties were milch cows and working oxen in 1880; but north and west of the valley and its tributaries, and nearer the South Platte river and the Colorado boundary, the percentage of farm cattle is only two and one-half. We find that in all the country west of the 99th meridian and north of latitude 40° 20′ working oxen and milch cows comprise but 3 per cent. of the neat stock.

In the agricultural part of Nebraska, *i. e.*, in all of the state east of the 99th meridian and south of about latitude 40° 20′, we find 35 per cent. of the working oxen and milch cows. These percentages are established from enumeration returns.

SHEEP.

About July 1 the sheep on an illustrative range, except the rams inclosed near the home ranch, are out on range. They are in separate flocks, ewes and lambs together, and wethers by themselves, each with a herder, who remains with his charge day and night, the ewe and lamb flock being generally corralled at night. Some corral all flocks at night. Throughout the summer ranging the sheep are moved as pasturage is eaten. For best results a flock should not exceed 2,500 head.

Each herder has a tent, a horse, a dog, and arms. A central corral will command such a circumference of range as to make it a fixture for some time. The owner or foreman, with headquarters on the home ranch, will, during the summer, supply provisions to his herders, oversee their management, repair fences, sheds, and corrals, haul the winter's stores from the nearest settlement, and make hay between the middle of July and the middle of August. For this work he will employ two men at $2 and board per day each.

In November, early or late, according to the weather and the character of the outside range, the flocks will be moved down to the pasturage reserved for winter, convenient to the home ranch, with sheds, haystacks, and sheltered corrals. Rams are fed a pound or two of corn or oats each day before and during service.

At the beginning of December the lambs, having been weaned, are banded by themselves or with weakly ewes, and the rams are put with the ewes to range, or they are only turned in with the ewes at night. After from four to six weeks of this disposition of the stock, the ewes and lambs may be combined in one flock again until the spring lambing time approaches. If snow lies long the sheep should be brought within the corrals and fed about two pounds of hay and one-fourth pound of corn per day each, which is scattered upon the snow. If these corrals are of ample capacity and guarded without on the northwest by a line of snow-fence or breaks to prevent snow-drifts within the corral, the sheep are better provided for, perhaps, than if sheds are used. Sheds are desirable for sick animals and protection of young lambs. The dangers most to be dreaded are blinding snow-storms ("blizzards") coming suddenly where sheep are on open range; cold rain-storms that reach the skin, and sometimes, when freezing follows, case the animal in a mail of ice, and deep snow covering the whole ground for a length of time. If a thaw follows such a fall and then severe freezing, the animals cannot travel on the crust, but must stand and die from hunger and cold. The most vigilant herder will sometimes be unable to secure his charge from harm, especially when winter comes early and with sudden fierceness, or where late in the spring the seeming surety of safe ranging is broken by cold and wet.

As instances of the former danger, may be mentioned one in November, 1879, and one in November, 1880, when Indian summer weather with good pasturage promised safety to flocks yet distant from the home ranches. In each case, without any recognized warning a furious snow-storm broke upon the plains at night; when morning came the thermometer had fallen nearly to zero, the wind blew a gale, and nothing could be seen a horse's length. The hastily aroused herders and their brave dogs could not control the sheep. The gale lasted for three days and

nights in each case. Sheep were drifted 40 and 50 miles from their ranges. Some were buried in snow-drifts; others died from exposure and want of feed. As soon as the violence and persistency of the storm were realized reliefs were started out. One herder was brought in helpless and badly frozen. His dog had kept with the fleeing sheep. The shepherd, lost and overcome by cold, had laid down to die. Another was discovered on his horse, but man, horse, and dog formed a motionless group; the herder unconscious, the horse almost dead, and the dog almost frozen. The sheep, of which many were suffocated, were found near by in the bed of a dry stream where the drifted snow had covered them in. Man and dog had to be carried 20 miles to the nearest roof. The physician called in thought the herder must lose both feet. He might have left his charge and sought protection while strength remained to himself and horse, but he staid by his sheep without food or shelter. It was said that the dog refused to eat or drink until his master, restored to consciousness, recognized him; then, when fed, he endeavored to return to the sheep.

In time of lambing, and for shearing and dipping, extra help is required. The flock of ewes is now placed under fence, if possible where there is abundant forage, natural or provided. They must be safe from alarm, and have shelter adjoining for use in storms, or where mothers and lambs may be placed when requisite. They are unceasingly watched day and night. Twins demand the most care, that they shall not be separated, or, if necessary, to find a nurse for one. Sometimes a suffering lamb requires to be warmed by a fire. The details of lambing, shearing, and dipping resemble those of other regions already described. Wethers are sold for home consumption, or sent to Council Bluffs to be sold as "feeders", or to Chicago as mutton. Wool is the principal object, but the mining settlements in the Black hills and other demands always furnish opportunity to sell mutton-sheep. In 1880 the double-decked cars were used on the Union Pacific railroad.

The plan is to preserve the hardiness and the motherly care of the Mexican sheep, as far as quantity and quality of wool and size of carcass may be grafted on that stock. Flocks may be bred in this direction until three-fourths merino. Length of wool, size of carcass, and early maturity are expected from crossing with either southdown, cotswold, or Leicester; each breed has its advocates. It is said that none of these do well in large flocks. The average sheep obtained in this way is expected to weigh alive 105 pounds, dressed 52, and clip 5 pounds of wool, worth 22 cents per pound in 1880.

SLAUGHTER.—According to Special Abstract No. 9, Manufactures, Tenth Census, the principal meat-packing establishments located in five counties slaughtered during the fiscal year ending June 30, 1880, 6,252 beeves, valued at $177,420, with an average live weight of 1,081 pounds; 10,859 sheep, valued at $34,410, with an average live weight of 95 pounds; 86,142 hogs, valued at $850,213, with an average live weight of 280 pounds; aggregate value of all animals, $1,062,043. There were 3,717,267 pounds of beef sold fresh, 46,000 pounds of beef salted or cured; 537,849 pounds of mutton sold fresh; 1,531,850 pounds of pork sold fresh, 7,263,443 pounds pork salted, 4,818,974 pounds bacon and hams, and 2,916,475 pounds of lard; an aggregate value of all products of $1,359,397.

The composition of thirteen herds of cattle, aggregating 51,596 head in 1880, was as follows: 777 bulls, or 1.5 per cent. of the whole; 17,083 cows, or 33 per cent.; 6,989 three-year-old beeves, or 13.5 per cent.; 8,283 two-year-olds, or 16 per cent.; 9,146 yearlings, or 18 per cent.; 9,318 calves, or 18 per cent. Estimated number of calves dropped to each 100 cows was 75; of these 55 survived to yearlings. The estimated average annual loss among cattle over twelve months old for a term of years was 6 per cent.

AVERAGE WEIGHTS AND VALUES OF GRASS-FED NEBRASKA CATTLE SOLD IN THE UNION STOCK-YARDS, CHICAGO, DURING NOVEMBER, 1880.

Breed.	Number.	Age.	Average live weight.	Average selling price.
		Years.	*Pounds.*	
Average	5,085	4	988.6	$31 19
Texan steers wintered one or more seasons on Nebraska ranges	1,847	3½	844	23 97
Texan steers wintered one or more seasons on Nebraska ranges	2,236	4½	967	29 51
Native steers improved by use of graded bulls	577	4½	1,230	51 12
Half-breeds, *i. e.*, from Texas cows bred to American bulls	925	4	1,069	33 32

MOVEMENT OF STOCK.

CATTLE.—The railroad returns showed that more than three-fourths of Nebraska cattle going east were from west of the 99th meridian; that is, were grass-fed cattle; they went to the Chicago packing-houses. The corn-fed beeves of eastern Nebraska were in great part consumed in the cities of the state.

SHEEP.—Nearly 71,000 more sheep were brought into Nebraska than were sent out, this amount constituting an addition to the 268,441 on hand July 1, 1880; but the winter that followed was perhaps the most disastrous ever known to sheep in that state. The wool-clip of 1880 we estimate to have been 1,046,920 pounds, *i. e.*, an average of 5 pounds from 209,384 adult sheep of the spring.

SWINE.—In this stock the tables show that Nebraska sent out 121,466, of which 94 per cent. was to the Chicago market. Of more than a million and a half of hogs, 1,450,902, or nearly 90 per cent., were in agricultural Nebraska, east of the 99th meridian. Beside the shipping and local consumption, there were 86,142 slaughtered by packing-houses in the state during the fiscal year ending June 30, 1880.

ESTIMATED MOVEMENT OF STOCK IN 1880.

From Nebraska.	Destination.	Cattle.	Sheep.	Swine.	To Nebraska.	Sources.	Cattle.	Sheep.	Swine.
	Total	80,900	8,920	121,466		Total	107,980	79,860	2,520
By drives	To Dakota (for stocking southwest Dakota).	8,000	7,000	.....	By drives	From Texas (for stocking western Nebraska).	50,000	.....	.....
By drives	To Wyoming (for stock)	8,000	.....	.....	By drives	From Colorado (for stocking western Nebraska).	20,000	40,000	.....
By railroad	To east, via Union Pacific Railroad and branches (cattle mostly for slaughter).	62,560	1,620	114,206	By drives	From Kansas (for stocking western Nebraska).	.....	10,000	.....
By railroad	To west, via Union Pacific Railroad and branches.	2,340	300	7,260	By drives	From Wyoming (cattle principally for stock; sheep partially for stock and partially for feeding).	25,000	20,000	.....
					By railroad	From east, via Union Pacific Railroad and branches.	6,240	7,820	2,520
					By railroad	From west, via Union Pacific Railroad	6,740	2,040	.....

CATTLE, SHEEP, AND SWINE IN NEBRASKA AS REPORTED FOR CERTAIN YEARS.

Year.	Authority.	Cattle.	Sheep.*	Swine.
1860	Eighth National Census (on farms)	37,197	2,355	25,369
1870	Ninth National Census (on farms)	79,928	22,725	59,449
1875	County clerk's returns, Johnson's History of Nebraska	242,659	36,014	146,933
1878	State auditor's annual report	513,668	131,787	562,799
1879	State board of agriculture report	552,167	140,289	637,125
1880	State auditor's biennial report	675,244	194,959	767,702
1880	Tenth Census (on farms)	758,550	199,453	1,241,724
1880	Tenth Census (on farms and estimated unenumerated ranch and range stock)	1,113,247	247,453	1,618,902

ESTIMATED CATTLE, SHEEP, AND SWINE IN NEBRASKA JULY 1, 1880.

Sections.	Sections defined.	APPROXIMATE ACREAGE OF STOCK OCCUPATION.		STOCK.		
		Cattle.	Sheep.	Cattle.	Sheep.*	Swine.
	Total	47,000,000	24,700,000	1,113,247	247,453	1,618,902
Eastern	East of about 99th meridian	21,000,000	18,000,000	571,386	207,653	1,450,902
Western	West of about 99th meridian	26,000,000	6,700,000	541,861	39,800	168,000

*See note to Texas tables, page 31. Indian stock is included in above.

Total land area of state	acres..	48,758,400
Total area of approximate available pasturage	do...	47,000,000
Total area of unoccupied available pasturage	do...	.....
Total population		452,402

AVERAGE DENSITY OF STOCK (CATTLE AND SHEEP) OCCUPATION.—Making one head of neat stock the unit of stock, and considering five sheep to equal one head of cattle in relation to consumption of pasture, we have 1,162,738 units of stock occupying 47,000,000 acres, or 40.42 acres to the head.

WYOMING TERRITORY.

PASTURAGE.

The total land area of Wyoming is 62,448,000 acres, and 50,000,000 acres are here estimated available for pasturage. This excludes the Yellowstone National Park, all lands providing no sustenance for animals, barren tracts, mountainous districts above vegetation, and tracts too rugged or too densely timbered to permit grazing. With nearly 43,000,000 acres occupied by either cattle or sheep or by both in 1880, there remained about 7,000,000 acres of unoccupied pasturage, almost wholly north of the 43d parallel, in the Big Horn region and on the headwaters of the Tongue, Powder, Little Missouri, and Cheyenne rivers. We find that Wyoming has within the occupation for 1880 about 70 acres to the unit of stock.

The northwest corner of Wyoming, 100 miles square, including the Yellowstone National Park, generally unoccupied, has been deemed too elevated and rugged for cattle-raising.

In the valley of the Big Horn, east of the Shoshone mountains, reaching to the Big Horn mountains on the east and to Wind river on the south, there were no cattle in 1878 north of the Indian reservation. On July 1, 1880, there were west of the Big Horn river not quite 19,000 head. In the valley of the Big Horn river and its tributaries there are nearly 2,000,000 acres of well-watered pasturage, in some sections entirely ungrazed. The winter climate is comparatively mild, and no losses incident to severe weather alone have yet been known. Though the winter succeeding the census research was the most inclement experienced there, it is said that the ranges, especially those about Gray Bull river, Gooseberry creek, Mee-ye-ro, Cottonwood and Owl creeks, were not at any time so covered with snow as to prevent grazing. The prevailing winds from the northwest are mild in winter, according to the testimony of those who have spent three years there.

Buffalo-grass constitutes principally the pasturage of this region, though in the watered valleys there is meadow-grass for horses and mules. Cattle work up into the mountains in summer, where there are many rich parks, cool and well watered. On the low winter ranges the dry stream-beds and other inequalities of a rough country furnish shelter. There were no sheep in this region in 1880. Barren and arid patches are found in the valleys and on the divides between water-courses of the low lands. The essentially "bad lands" west of the Big Horn river lie along Stinking Water, below Meteetoe creek, and extend west again from the Big Horn river between Gray Bull river and Gooseberry creek, according to the reports of army officers who have served in that country and are personally familiar with the ground.

Between the Big Horn river and the Big Horn mountains there was no stock in 1880 north of the 44th parallel, except one herd near the mouth of Shell creek. South of the 44th meridian a few small herds had come in from the east around the base of the Big Horn mountains, up the north fork of Powder river, and located along the upper waters of Painted Rock creek and toward No Water creek. The only account of that region is General Sheridan's reconnaissance of 1877, down Painted Rock creek, following closely the western walls of the mountains and crossing them to the eastward just below the Montana boundary. The western flanks of these mountains are more abrupt than the eastern, and the exposure to storms and cold is greater, though snows do not lie so long. From what could be gathered concerning the country, its character is more rugged than that west of the Big Horn river and the proportion of bad land is greater, but where available pasturage exists it is buffalo-grass that has not been cropped by domestic animals.

NORTHEAST WYOMING.—About one-seventh of the whole territory lies between the Big Horn mountains and the Black hills of Dakota, with the south forks of the Cheyenne as the southern limits. From fort Fetterman to Sage creek the water is poor and only in holes, there is little grass, and the land is generally overstocked. North to Antelope creek is a rolling country, with good bunch-grass and water only in holes in the creek beds. Cottonwood grows in small groves on the streams. There was no stock between Antelope creek and Powder river. The country traveled, southwest from Powder River post-office and then northeast beyond the Big Horn mountains nearly to the 108th meridian, is of one general character. The mountains rise north and south from the forks of the Powder river and slope east and west, leaving a bottom of from one to three miles as the streams widen. Occasional clumps of cottonwood stand along the valley, while groves of pine are seen here and there on the mountains. Mr. Masi speaks of the soil as a "sand and mud wash or drift from the Big Horn mountains". The pasturage he says is good, especially on the bluffs, but already overstocked.

Northward on both sides of the Powder river the country is much broken with deep gulleys. Masi found pasturage, bunch, buffalo, and bottom grasses, plenty of good running water, rolling bluffs away from the streams, the high divides bare of timber, and the feed back from the streams uncropped. The ranges on Crazy Woman's Fork and Clear Fork creeks for 30 miles down from the mountain sources were occupied. On the Clear fork Masi found

17,411 head of cattle, pretty fully stocking the river ranges all the way down to the Powder. About lake de Smet and old fort Phil. Kearney there is considerable fencing, and land is located under the homestead and desert-land acts.

On the divide from the Big Piney creek to Little Goose creek Masi found "bunch-grasses 8 inches high and growing very thick on smoothly-rolling bluffs. This section is well watered and near enough to the mountains for timber, of which there are forests of pine west and north." From the divide to where the Tongue river enters the cañon of the Chetish or Wolf mountains, 10 miles north of the boundary between the two territories, there were October, 1880, 17,366 head of cattle and one flock of sheep, many having come in after July 1, 1880, for which date the count of stock on hand was made for this report. The land along Little Goose creek was taken up by farmers, and most of the land was fenced. The waters of all these creeks, coursing from the northeast slope of the Big Horn mountains above Cloud Peak to the Montana boundary, are very fine and abound in trout. All the country north and northwest of the sources of Tongue river was occupied by buffaloes.

The country all about the north bend of the Belle Fourche and the spurs of Bear Lodge mountain is good range, with grass, wood, and water. There was no stock on the north side of the Belle Fourche from a point 10 miles south of the Montana boundary for 60 miles up the river. Near the 44th parallel one man had come in that fall with 1,800 Colorado cattle. With that exception Crook county west from the Belle Fourche and north of Antelope creek was unoccupied in December, 1880.

All but two of the ranches in the Black hills were occupied by neat stock, yet the nature of the range seems adapted to sheep husbandry. There was a flock of 2,700 sheep on Oak creek and another of 4,000 on Sun Dance hills, principally for mutton. Though a very cold region (Masi one night experienced 17° below zero), the dry winds sweep off the snows. There is great variety of pasturage and of opportunities for shelter. Near the 44th parallel, about the headwaters of Inyan Kara creek, pasturage is very thin, there being no water supply. That quality of range continues until the north Beaver fork becomes a running stream. Further south, to the west fork of the Beaver, the country in Wyoming is dry and very rough. The north region of the Black hills in Wyoming, where not actually in dense timber, has good summer and winter pasturage, timber, water good and abundant, and shelter everywhere. Population is fast coming in to occupy farms; 17,204 head of neat stock were found in the section traversed in the Wyoming side of the Black Hills country, and including the ranges of the west fork of the Beaver. For from 5 to 20 miles in width and 80 miles up the south fork of the Cheyenne there were then 20,224 head of cattle and eight or nine ranches.

Northeast of the north Platte for 120 miles west of the Nebraska line is mostly a sage plain, except the region lying northeast of Fort Laramie, on the Running Water, Spoon Hill, and Raw Hide creeks. It is the main divide between the water-courses running north and northeast to the Yellowstone and the Missouri rivers and the valley of the north Platte.

South of the north fork of the Platte, east of the 107th meridian, lies the noted pasture of the Laramie plains, a park west of the Laramie range of mountains. This pasture-ground, well known since 1870, has been crowded with stock since 1876. The pasture is poor on a part of the west Laramie plains, northwest of Cooper's lake, and also north of the Medicine Bow river; elsewhere, below forests and even above them, is strong, sweet grass, sometimes to the very border of snow. The southern part is the best.

The extensive fencing of hay lands on all the good bottoms, the dairy interests, especially near the immediate line of the Union Pacific railroad, and the raising of garden crops for the limited home demand of a comparatively small population, constitute the present extent of agricultural operations in this region, where the annual rainfall is from 15 to 20 inches only.

The Laramie plains contain in their entire extent from 3,250,000 to 3,750,000 acres. Here is the densest sheep occupation in Wyoming.

West of the 107th meridian we have a very unequal character of pasturage and of occupation.

North of the Sweetwater river to Bad Water creek, with the north Platte and Poison Spring creek on the east and Beaver creek on the west, lies the Rattlesnake hills country. Its interior, 10 miles from the streams named, is only winter range. The bunch-grasses and sages constitute its pasturage. Rugged granite croppings, the extremities of the Big Horn mountains, spread out across its eastern half. On the ridges of the Rattlesnake hills, and in the northwest corner below Bad Water creek, there are patches arid and barren. The best portions of this region north of the Sweetwater are in the east on Horse creek and other beds, dry for three-quarters of the year, that run northeast and southeast from the eastern spurs of the hills to Poison creek and the north fork of the Platte; also along the east side of Beaver in the west. Cattle wander far over most of this country during winter, and find the scattered pasturage good provender where free of snow. There were no sheep there in 1880, except close about the Sweetwater and the Beaver.

South of the Sweetwater to the Union Pacific railroad, and indeed including all of Wyoming south of the Sweetwater river and the Wind River mountains, from the north fork of the Platte to Green river, is a large extent of generally poor pasturage. Along the streams it improves; here and there are valleys of excellent range. North of the railroad it is a desolate, almost arid region. Its springs or lakes, so called, are often sulphurous or alkaline,

unfit to drink. Just south of the Sweetwater mountains the plain is of moving sand, but south of the railroad there are numerous limited areas of grazing, especially for summer range.

Although the region between the 107th meridian and Green river was occupied next in order of time to the Laramie district, it held July 1, 1880, only about 45,000 cattle and 35,000 sheep. There were no sheep north of the Sweetwater and east of Beaver creek except immediately on those streams. East of the Wind river range, and between the Shoshone reservation and the Sweetwater, there is exceptionally good grazing with an easy change from summer to winter pasturage. West of Green river and the Sandies we find closer occupation and better pasture. Cattle and sheep range to the Snake river cañon, at the base of Mount Baird, and well into the Gros Ventres mountains. All of the southern spurs of the Gros Ventres abound with parks for summer pasture, and, except where the timber is dense, stock, especially sheep, can find good living for five months of the year high up in the mountains. In winter the descending plateau between the two ranges over the so-called Colorado desert everywhere produces scattered bunch-grasses and sage-brush. At the south end of the Wind river range, on the headwaters of the Sweetwater, hay is cut. Cattle were held in the southwest, near Fort Bridger, for local supply, at an early date. In October, 1879, and in November, 1880, the region embraced within a circuit of 30 miles of Fort Bridger contained few cattle and fewer sheep. The largest herd depended for winter feed on the hay cut from an immense fenced meadow. The summer pastures are numerous and excellent, but there is less winter pasture in proportion; moreover, the winters are very severe. The character of the lowest plateau is poor, the bunch-grasses are scarce and widely scattered, the sages stunted and thin. The slopes of the mountains up to the barren summit are timbered with spruce, aspens, and pines, generally interspersed with pasture grounds. Cattle were decreasing in 1880, moving northward, and sheep were taking their place. In extreme southwest Wyoming the winter of 1880–'81 is reported as unusually mild.

Of the estimated total area of available pasturage (50,000,000 acres) in 1880, 7,275,000 were unoccupied, mostly lying north of the 43d parallel. The southeast corner had the densest occupation by cattle; next in order were Albany and Laramie counties, north of the Platte; then came Carbon county, north of the Platte and Sweetwater rivers. Over the rest of the territory, considered as a whole, there was not more than one head of neat stock to the hundred acres of pasturage. Whilst cattle roamed over 85 per cent. of the available pasturage of the territory, the sheep were limited to 32 per cent. Sheep were densest in the southern third of Carbon, Albany, and Laramie counties, south and east of the north Platte; next in Uinta county; then just west of the north Platte and south of the Sweetwater in Carbon county; and, finally, in the southern half of Sweetwater county. Beyond the occupation thus defined there were scarce half a dozen flocks in the territory.

CATTLE.

In Wyoming and in Nebraska there is relatively a large proportion of graded shorthorns beside some Hereford cattle, and of sheep improved by merino, cotswold, and other blood. The management of cattle in these Northern ranges resembles in its general features the administration of stock business already described in the report on Texas, varying in such local details as arise from a difference of climate, the different character of surface, and the difference in the accessibility of markets. The railroad systems are pushing so rapidly into the great grazing regions of the northwest that the facility of shipment changes almost month by month.

In Wyoming, taking the region of the Laramie hills for example, the animals are left during the winter largely to follow their own instincts in search of food; this mingles the cattle of different brands to much greater extent than at other seasons of the year. The spring "round-up", therefore, becomes the great event of cattle management. There may be numerous "round-ups" in which a given owner may be interested. He may gather in this manner his own cattle, or those in the district usually ranged by his cattle, when he wishes to inspect them for any purpose. There are the gatherings of beeves, occurring usually late in the summer or in the fall; there are local "round-ups" for branding calves, or they may occur on occasion of transfer of property. All of these, for whatever cause instituted, are conducted with a similarity of plans differing in detail according to the magnitude of the interests represented and the number therefor uniting on the occasion. In each case those in the immediate vicinity send representatives, who work under the direction of the leader of the "round-up". All these lesser occasions sink into insignificance compared with the wide-reaching, united effort which constitutes the spring "round-up". At this time the cattle of the miscellaneous brands are separated and the calves are marked with the brand of their mothers. So large a force is gathered that under the command of a leader the whole country designated for the appointed meeting is thoroughly explored, the men are assigned to their various duties, subdivided in squads for daily explorations, detailed as herders of the cattle as they are "cut out" for each owner, or arranged in their watches by night. Not only is the single spring "round-up" of such proportions, but in the growth of the cattle interests an organization has arisen by which the vast area of Wyoming and western Nebraska is subdivided by a central authority in preparation for these occasions.

The local stock associations of Wyoming and Nebraska are generally members of the Wyoming Stock-Growers' Association. Inspectors are constantly employed to keep watch of all the avenues by which stock could be removed.

The railroads, both in the cattle districts and at points where cattle are fed or discharged, as also the local markets, are under the watch of this organization. A much more complete security against theft and straying is thus attained than could possibly be reached by the individual effort of the owners. The association also takes measures to guard the ranges from diseased cattle. The great "round-ups" of the spring (a) are planned and directed by this association.

In the general "round-up" every cattle-owner, without reference to the size of his herd, assists in working the designated region of which his individual range forms a part.

After the spring "round-up" and the return of cattle to their own ranges, there is a period of comparative rest which enables the men and the animals to recruit. Opportunity is thus given for washing the clothing, healing the backs of the horses galled by the heavy stock-saddles, horseshoeing, and the repair of accouterments. The cook is in reality the only member of the outfit whose time is not largely his own. Toward the 1st of August haying begins, and hay is cut for those horses kept up for winter use and is stacked in ricks adjacent to the ranch stables. By the 20th of August haying is usually completed, the ricks topped and anchored by "crow-foots" against the violent winter storms. The labors incident to haying require good management in the adjustment of labor. The man from Iowa or Missouri works well in the hay-field, but the Texan dislikes agriculture. In the vernacular of the country he "would rather get his time than bother the ground". Digging post-holes is his special aversion, but he is at home in the care of stock. After haying will come the "round-ups" of beeves, according to the condition of the animals and the character of the season. The herd of beeves is taken to the railroad at Cheyenne, for example, and the character of the drive resembles that of drives from Texas, with the need of more minute care and knowledge of the country to avoid worrying the animals and to keep them from losing flesh. A crew of reliable cowboys with a competent "boss" can take beef-cattle through very rough country without perceptible shrinkage or loss, unless by unforeseen accidents.

The fall "round-up", selecting the fat beeves late in the season and branding such calves as may have been overlooked, is only inferior to the great spring "round-up" in the number of riders and mess-wagons collected. Two weeks, and often three, are necessary for this fall rodeo. For the winter a few of the best men are retained, even though their active service is not constantly required. The winter is a period of apparent inactivity in the care of cattle; the horse range is ridden two or three times a week, and the saddle-horses kept up for this purpose are fed with grain. Though the weather is apt to continue inclement during December and January, making it often difficult to get into the hills for posts or poles for fencing hay-bottoms or pastures, or to haul out logs for constructing new stables or corrals, the foreman and his winter crew do some such work on every seasonable day, showing very creditable results by the conclusion of cold weather. Usually nothing is done on the range except to keep run of the horses; the cattle occupy whatever grazing ground they choose. Occasionally, however, cattle drift before storms so that a part of the region becomes overstocked by the cattle driven in upon it, and it becomes necessary to organize a "drive-back", to prevent the starvation of animals or their suffering from lack of water or of shelter. This is one of the most disagreeable of all the duties of the cowboys, but when the case is imperative something like a winter "round-up" is organized, and some thousands of cattle are gathered and crowded back into ranges where there is a better supply. During the cold months the camp-life becomes quite monotonous, but it is

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a The following, from the printed circular of the Wyoming Stock-Growers' Association, shows the skeleton plan of one of thirteen similar "round-ups" organized in 1881 by that body:

"ROUND-UPS."

Wyoming Stock-Growers' Association, pursuant to call, met at Cheyenne, April 4, 1881, and provided for the following round-ups during 1881:

Round-up No. 1 shall begin at fort Laramie on May 23, shall proceed up the south side of the Laramie river to the mouth of Sabile creek, up the Sabile to the Black hills divide; thence to the head of the Chugwater; down the Chugwater to Kelly's ranches; thence to the head of Richard's creek; down said creek to its mouth; thence to Houston's creek; thence to the Bear creeks, up said Bear creeks to their head; thence to the telegraph road, where it intersects Horse creek; thence up said Horse creek to Horse creek lakes; thence to the head of Pole creek, and down Pole creek to the telegraph road; thence across the country to Big Crow springs; thence up Big Crow creek to its head; thence across to the bend of Lone Tree creek; thence down Lone Tree to Charles Terry's ranch; thence to Jack Springs; thence to Box Elder.

JAMES LANE,
W. H. HACKNEY,
Foremen.

* * * * * * * *

Attention is called to the following resolutions adopted by the association:

Resolved, That persons desirous of participating in said "round-up" are requested to be at the places fixed for the starting of said "round-up" on the day previous to the one stated.

Resolved, That in order to obtain greater efficiency in round-ups, we hereby agree to place our men under the orders of the foreman of the round-up they may be attached to so long as they may remain with it; and, in case of refusal by any man to do faithfully and well the duty assigned to him, or to obey the orders given him by the foreman in driving, cutting out, or other matters, we hereby authorize the foreman of any "round-up" to prohibit any man offending from further participation in it.

[The magnitude of the labor to be accomplished by "round-up No. 1" may be appreciated when it is explained that during the five or six weeks to be occupied in this business, the mere linear distance between the camping places as designated by the above order amounts to over 400 miles.]

sometimes varied by an elk-hunt in the adjacent Black hills, or by a dance at some neighboring ranch. By the latter part of March the first springing of the green grass indicates the coming of the spring work. Some local gathering of calves may take place preliminary to the great spring "round-up". The general conduct of the year's work will be varied by the occasions of the bringing of supplies, and of hiring new men, who are especially apt to change more or less when they go with droves to the railroad stations. With the facilities of transportation and the great business now done in canned supplies, it is possible to have such a range of provisions that with a good cook the men can live very well.

Of 10,773 Wyoming four-and-a-half-year-old beeves sold in Chicago November, 1880, 8,973 were Texans, wintered one season in Wyoming, having an average live weight of 979 pounds, and 1,800 were natives, having an average live weight of 1,095 pounds.

The estimated average live weight of three-and-a-half-year-old Texan cattle wintered one season in Wyoming was 850 pounds; dressed weight, 445 pounds; improved Texan, live weight, 1,050 pounds; dressed weight, 555 pounds; American, live weight, 1,100 pounds; dressed weight, 580 pounds; improved American, live weight, 1,175 pounds; dressed weight, 625 pounds.

The composition of fifty-four herds of Wyoming cattle, aggregating, in 1880, 94,409, was as follows: 1,133 bulls, or 1.2 per cent. of the whole; 32,090 cows, or 34 per cent.; 10,857 beeves, or 11.5 per cent.; 13,509 two-year-olds, or 14.3 per cent.; 16,994 yearlings, or 18 per cent.; 19,826 calves, or 21 per cent. The estimated number of calves dropped to each 100 cows in Wyoming was 76; of these 62 survived to yearlings.

The estimated average annual loss among Wyoming cattle over twelve months old for a term of years was 6 per cent., from the following causes: Disease, winter and spring storms, theft, snake-bites, poisonous weeds, and wild animals.

AVERAGE VALUES OF WYOMING CATTLE ON RANGE IN 1880.

Kind of cattle.	Bulls.	Cows.	Beeves.	Three-year-old steers.	Two-year-old steers.	Two-year-old heifers.	Yearling steers.	Yearling heifers.	Calves.
Texas trail cattle	.....	$13 00	$21 00	$17 00	$13 00	$12 00	$9 50	$8 50	.....
Texas improved	.....	16 00	$24 00 to 25 00	$20 00 to 21 00	16 00	15 00	.....	.....	.....
American trail cattle	$20 00	19 00	30 00	26 00	22 00	18 00	14 00	13 00	.....
American improved, bred on Wyoming ranges.	75 00	21 00	32 00 to 35 00	28 00 to 30 00	25 00	20 00	$16 00 to 17 00	$15 00 to 16 00	$10 00

The composition of five flocks of Wyoming sheep, aggregating in 1880 52,390 head, was as follows: 690 rams, or 1.31 per cent. of the whole; 24,800 ewes, or 47.34 per cent.; 15,800 wethers, or 30.16 per cent.; 11,100 lambs, or 21.19 per cent.

The estimated number of lambs dropped to each 100 ewes during an average spring in Wyoming territory was 85; lambs survived to yearlings, 44 per cent.

The estimated average annual loss among Wyoming sheep over twelve months old during a term of years was 9 per cent., made up from the following causes: Winter storms, disease, wild animals, old age, poisonous weeds, snake-bites. Scab is the only prevalent disease among sheep; it is brought in by trail-sheep, and is treated by dipping.

ESTIMATED AVERAGE VALUE AND WEIGHT OF STOCK AND MUTTON-SHEEP AND THE ESTIMATED AVERAGE ANNUAL WOOL-CLIP FOR 1880.

Kind of sheep.	VALUE.				MUTTON-SHEEP.		AVERAGE ANNUAL SHEAR.			
	Rams.	Ewes.	Wethers.	Lambs.	Average live weight.	Average value as mutton.	Rams.	Ewes.	Wethers.	Lambs.
					Pounds.		*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Full Mexicans	$1 50	$1 85	$1 75	$1 00	80	$2 20	3.5	2.5	3	2
Half-breed Mexican merinos, i. e., bred from Mexican ewes and crossed with merino rams.	.....	2 75	2 75	1 75	90	2 75	.....	4	4.5	3
Half-breed Mexican cotswold, bred from Mexican ewes and crossed with cotswold rams.	.....	3 00	3 25	2 00	115	3 25	.....	3.75	4	2.75
High-grade merinos	$10 00 to 15 00	$3 50 to 4 00	$3 25 to 3 50	$2 75 to 3 00	100	3 00	10	6	7	4.5
High-grade cotswold	14 00 to 18 00	3 75 to 4 25	4 00 to 4 50	3 00 to 3 25	125	4 25	7	5	6	4

AVERAGE WOOL-CLIP AND INCREASE IN SELECTED FLOCKS DURING A SERIES OF YEARS.

[Compiled from statements furnished by the owners.]

Year.	Breed of the sheep in the flocks cited.	Sheep sheared.	Average weight of wool per sheep.	Breeding ewes.	Lambs actually surviving to yearlings.	Percentage of lambs surviving to total number of ewes.
			Pounds.			
1875	Half-breed Mexicans, *i. e.*, bred from Mexican ewes crossed with merino or cotswold rams.	15,120	4.24	7,600	5,344	70.3
1876	do	19,294	4.66	10,246	7,124	69.5
1877	Grade merino and cotswold, bred up from Mexican ewes	17,670	5.08	11,956	8,400	70.2
1878	do	23,152	5.36	13,136	9,000	68.5
1879	do	36,144	5.56	20,422	12,760	62.5
1880	do	63,984	6.07	35,470	22,780	64.2

The figures given in our table represent the actual experiences of a dozen prominent wool-growers of Wyoming territory whose management is above the average. These figures cannot be taken as applicable to the territory at large.

Probably three-fourths of the sheep of the territory are animals bred from original Mexican ewes crossed with merino and to a less extent with cotswold rams.

MOVEMENT OF STOCK.

CATTLE.—We estimate 364,010 cattle brought in against 160,920 sent out. The difference, 203,090, was added during the last half of the year. About 60,000 of those sent out were for Chicago. The great number of animals coming into the territory was owing to the severe preceding winter and to the driving out of cattle by the advance of sheep and agriculture in Oregon, Washington, and Utah, and to the flight of stock from the drought in Colorado. To these causes was added the demand for stock-cattle in Montana, Wyoming, Dakota, and Nebraska, especially in Wyoming, where 100,000 head were located in the new country from the Big Horn mountains to the Little Missouri river. The season following, from November, 1880, to March, 1881, is now known to have been very disastrous there.

SHEEP.—The territory added 56,700 head to her stock in the last part of 1880 over the number on hand July 1. A demand for mutton had begun, largely for the Black hills country, and for sheep to feed in Nebraska.

SWINE.—Swine were raised only for local consumption.

ESTIMATED MOVEMENT OF CATTLE AND SHEEP IN 1880.

FROM WYOMING.				TO WYOMING.			
	Destination.	Cattle.	Sheep.		Source.	Cattle.	Sheep.
	Total	160,920	39,140		Total	364,010	95,840
By drives	Montana (Custer county)	12,500	1,500	By drives	Washington territory	62,000	.....
By drives	Dakota	20,000	8,000	By drives	Oregon	58,300	15,000
By drives	Nebraska, for shipment from stations of Union Pacific railroad.	10,000	.....	By drives	Nevada	20,000	.....
				By drives	Idaho	50,000	.....
By drives	Nebraska, for stocking northwest Nebraska.	25,000	20,000	By drives	Utah	42,000	20,000
By drives	Colorado	10,000	7,000	By drives	Montana	20,000	.....
By railroad	Council Bluffs and Chicago, via Union Pacific railroad.	76,100	2,040	By drives	Colorado	50,000	8,000
				By drives	Nebraska	8,000	.....
By railroad	Denver and Kansas City, via Denver Pacific railroad and Colorado Central railroad.	6,620	480	By drives	Texas	46,530	.....
By railroad	The west, beyond the territory	700	120	By drives	New Mexico	.....	22,000
				By drives	California	.....	30,000
				By railroad	Colorado, via Denver Pacific railroad	560	240
				By railroad	The east, via Union Pacific railroad	3,020	360
				By railroad	The west, via Union Pacific railroad	3,600	240

A part of the cattle movement between Wyoming, Colorado, and Nebraska was of beef-cattle, which thus reached the railroad more conveniently for shipment eastward. In 1878 about 10,000 were thus shipped from Wyoming to Council Bluffs or to Chicago.

CATTLE, SHEEP, AND SWINE IN WYOMING TERRITORY AS REPORTED FOR CERTAIN YEARS.

Year.	Authority.	Cattle.	Sheep.*	Swine.
1870	Ninth Census (on farms)	11,130	6,409	146
1880	Tenth Census (on farms)	278,073	140,225	567
1880	Tenth Census (on farms and estimated unenumerated ranch and range stock)	521,213	450,225	919

*See note to Texas tables, p. 31.

ESTIMATED CATTLE, SHEEP, AND SWINE IN WYOMING TERRITORY JULY 1, 1880.

Sections.	Sections defined.	APPROXIMATE ACREAGE OF STOCK OCCUPATION.		STOCK.		
		Cattle.	Sheep.	Cattle.	Sheep.*	Swine.
	Total	42,725,000	16,100,000	521,213	450,225	919
Northeast	East of the Big Horn mountains and north of the north boundary of Carbon, Albany, and Laramie counties.	5,710,000	100,000	41,665	10,579	.....
Southeast	Carbon, Albany, and Laramie counties	18,515,000	6,500,000	421,000	364,082	576
Western	Uintah and Sweetwater counties	18,500,000	9,500,000	58,548	75,564	343

*See note to Texas tables, p. 31.

Total land area of territory	acres..	62,448,000
Total area of approximate available pasturage	do...	50,000,000
Total area of unoccupied available pasturage	do...	7,275,000
Total population		20,789

AVERAGE DENSITY OF STOCK (CATTLE AND SHEEP) OCCUPATION.—Making one head of neat stock the unit of stock, and considering five sheep to equal one head of cattle in relation to consumption of pasture, we have 611,258 units of stock, occupying 42,725,000 acres, or 69.90 acres to the head.

DAKOTA TERRITORY.

Not lying in the direct road of emigration from the east to the Pacific, and being the country of some of the most warlike tribes, Dakota was avoided by white men until years after traders and miners had established themselves at many points farther west. Even in 1861 the territorial organization did not immediately induce an active immigration, as the energy of the nation was then engaged in the war for the Union. The few who entered the boundaries of the new territory to make homes in the southeast corner were driven out and despoiled in 1862 by the Sioux. That raid discouraged other immigration for years, and up to 1875 there were not 50,000 inhabitants, and they were located only in the extreme northeast and southeast corners. The Black hills gold excitement of 1875 gave direction to immigration, and in five years 85,000 people were added to the population. With the earlier settlers the improved cattle and sheep of Minnesota, Iowa, and farther east came into eastern Dakota. No cattle and sheep came into western Dakota beyond the needs of freight and food until the spring of 1876, since which time the stock has increased more rapidly than in Dakota east of the Missouri. The southwestern cattle are from Montana, Wyoming, and Colorado, with a large share of Texan blood.

PASTURAGE.

The borders of the Red and the James rivers and the southeast corner of the territory are agricultural and are rapidly filling with population. The regions occupied for grazing are between the Missouri and the James rivers as far south as the 44th parallel and the southwest corner of the territory. In 1880 there were but few herds comparatively between the James and the Missouri, and those very small, none over a few hundred head. The ranch occupation of the Black hills region requires less than 50 acres of pasturage to the head. On many streams rising in the Black hills and emptying into the Belle Fourche and south fork, for example the lands along Hay creek, Red Water, Spearfish, False Bottom, Whitewater, Bear Butte, Spring creek, Alkali, Elk creek, Box Elder, Rapid, Spring, and Butte creeks, and 10 miles of the Belle Fourche below the mouth of the Whitewood, were occupied each for a few miles of width by farmers. The other streams south of Butte river are entirely ranged by cattle. Custer and Forsyth are peculiarly cattle-ranch counties. The main Black hills are covered with pine forests. The stock and farm country begins in the foot-hills.

July 1, 1880, there were about 40,000 cattle and 20,000 sheep in the Black hills country of Dakota down to the Nebraska line. Later new herds and flocks came in large numbers. Both classes of stockmen pronounced the country excellent for their purposes. Though cold, the constant dry winds sweep off the snow; the foot-hills and ravines, with timber, afford shelter; and grasses, principally "buffalo", furnish feed.

North of the Cheyenne river, on both sides of the Missouri, up to the line of the Northern Pacific railroad, extending east 30 miles, and west to the upper courses of the Cannon Ball river and its forks, *i. e.*, to the so-called "bad lands", the general character of the pasturage is good, but in 1880, within Campbell, Boreman, and Emmons counties, there were but a half dozen herds of neat stock and no sheep. All of that tract west of the Missouri and south of the south fork beyond Cannon Ball river is still Indian country. Along Grand river beef contractors generally hold from 2,500 to 3,000 cattle for Indian supply, and the Indians had 800 on the reservation in 1880. All along the line of the Northern Pacific railroad in the territory the energies and investments were found turned to wheat-growing and railroad building. Throughout southeast Dakota and down the Red river in the northeast the country is thinly stocked, as compared with southwest Nebraska and Wyoming. Along the Sioux, Vermillion, and James rivers, cattle and sheep were kept only in connection with other industries, 100 head of either being a large number for one owner. Sometimes several owners combined their small herds and sent them northwest to be grazed over winter, under the charge of herders who received $1 per head for the season, or 10 cents per month per head, with horses and board. Otherwise, the numerous small herds were kept on open or hired pastures near home, and corraled at night during summer, and fed in winter. In 1875 and 1876, when the grasshoppers destroyed farm crops, there was some impetus given to a stock business more nearly approaching the ranch system, but with the increasing immigration and the renewed success of farm crops that interest was temporary.

SLAUGHTER.—According to Special Abstract No. 9, Manufactures, Tenth Census, five meat-slaughtering establishments in Dakota slaughtered, during the fiscal year ending June 30, 1880, 1,535 beeves, valued at $56,950, with an average live weight of 880 pounds; 791,500 pounds of beef were sold fresh, and 50,000 pounds salted or cured; 1,765 sheep slaughtered, having an average live weight of 88 pounds, valued at $7,060; 59,000 pounds of mutton were sold fresh; 2,750 hogs slaughtered, valued at $31,970, having an average live weight of 349 pounds; 73,300 pounds of pork sold fresh; 396,000 pounds of pork salted; 95,000 pounds bacon and hams; 18,000 pounds of lard.

Of 445 cattle sold in the Union stock-yards, Chicago, during November, 1880, 108 were Dakota-Texas, *i. e.*, Texan steers wintered one or more seasons in Dakota, having an average live weight of 865 pounds, realizing an average gross price of $22 92 per head, and 337 were American (native) bred in Dakota, having an average live weight of 1,140 pounds, and realizing an average gross price of $35 80 per head.

MOVEMENT OF STOCK.

CATTLE.—The importations were all practically accomplished after July and aggregated 96,800, as estimated. Over 67 per cent. of this increase was principally for stocking the southwestern ranges, in the angle between the Missouri and the Big Cheyenne rivers. The beef-cattle (30,000) were of course only for transitory occupation, and were probably slaughtered within twelve months. In this aggregate there were also 7,000 Montana cattle sent to be shipped east from Bismarck. Of neat stock sent out of Dakota it was found impossible to tabulate satisfactory figures for several reasons, among which is that the Union Pacific railroad at western Nebraska stations kept no record of the sources from which cattle started.

SHEEP.—As estimated, there were 8,000 sheep brought from Wyoming and 7,000 from Nebraska. The wool clip was about 316,000 pounds, or estimated at an average of 5 pounds from 63,206 sheep sheared.

SWINE.—With but 65,710 hogs, Dakota buys pork, hams, and bacon from the east.

ESTIMATED CATTLE AND SHEEP BROUGHT INTO DAKOTA TERRITORY IN 1880

	Source.	Cattle.	Sheep.
Total		96,800	15,000
By drives	From Texas (mostly beef-cattle for Indian reservations)	30,000	
By drives	From Texas (for stocking)	31,800	
By drives	From Wyoming	20,000	8,000
By drives	From Montana (en route for the east)	7,000	
	From Nebraska (for stocking)	8,000	7,000

ESTIMATED CATTLE, SHEEP, AND SWINE IN DAKOTA TERRITORY AS REPORTED FOR CERTAIN YEARS.

Year.	Authority.	Cattle.	Sheep.*	Swine.
1860	Eighth Census (on farms)	801	198	287
1870	Ninth Census (on farms)	12,467	1,901	2,033
1880	Tenth Census (on farms)	140,815	30,244	63,394
1880	Tenth Census (on farms and estimated unenumerated ranch and range stock)	206,783	85,244	65,710

*See note to Texas tables, p. 81.

Although Dakota, as a separate division, was not organized in 1860, the census enumerations of that year have been adopted, so far as they relate to the area of the present Dakota.

ESTIMATED CATTLE, SHEEP, AND SWINE IN DAKOTA JULY 1, 1880.

Sections.	Sections defined.	APPROXIMATE ACREAGE OF STOCK OCCUPATION.		STOCK.		
		Cattle.	Sheep.	Cattle.	Sheep.*	Swine.
	Total	16,500,000	3,500,000	206,783	85,244	65,710
Eastern	East of the Missouri river	11,500,000	2,000,000	138,723	62,101	56,210
Western	West of the Missouri river	5,000,000	1,500,000	68,060	23,143	9,500

*See note to Texas tables, p. 31. Indian stock is included in above.

Total land area of territory	acres..	94,528,000
Total area of approximate available pasturage	do...	75,000,000
Total area of unoccupied available pasturage	do...	58,500,000
Total population		135,177

AVERAGE DENSITY OF STOCK (CATTLE AND SHEEP) OCCUPATION.—Making one head of neat stock the unit of stock, and considering five sheep to equal one head of cattle in relation to consumption of pasture, we have 223,832 units of stock occupying 16,500,000 acres, or 73.72 acres to the head as estimated.

MONTANA TERRITORY.

The present territory of Montana was organized in 1864. Previous to 1854 the history of the region is mainly that of a few hunters and explorers and the trading posts of the fur companies. Sir George Gore traveled over most of the Montana country, south of the Yellowstone, from 1854 to 1856. He was an eccentric sportsman and daring adventurer from Ireland, who, with a well-equipped party, pushed from fort Laramie to the Yellowstone, by way of Powder river, and thence up to the Tongue river, where he built a fort and established his headquarters. In the record of his adventures we find the first account of cattle in Montana, and that he gave away his cattle to the hangers-on of the Indians at fort Union, when he had descended the Yellowstone to that post on the Missouri.

A half-breed named Benetsee was reported to have found float-gold in the lower end of the present Deer Lodge county in 1852. In 1858 James and Granville Stuart, Virginians, who had been in California, went into Montana, and at the mouth of what is now Gold creek (then known as Benetsee creek), they found John M. Jacobs camped with a band of cattle that he had taken from John F. Grant, a French Canadian, on shares. Afterward they joined camp with Thomas Adams, who also "had a band of cattle".

According to Mr. Granville Stuart, John F. Grant's father had five or six hundred cattle in the Bitter Root valley (vicinity of fort Owen, Missoula county) about 1854 or 1855, and other men at various times from 1832 to 1858 had brought in small numbers of cattle obtained in trade with the overland emigrants. In John F. Grant's herd were some good shorthorn bulls, and the early importations were good American cattle principally from Missouri, Iowa, Minnesota, and Wisconsin.

In 1858 there were but few whites in what is now Montana. The results of the prospecting on Gold creek caused a movement into Montana in 1861 and 1862, bringing cows and oxen as draft animals, turned out as stock on arrival. Nevertheless, during the fall of 1862 and 1863, there were not 700 white persons in the entire country now called Montana.

In the fall of 1862 the two Stuarts took a large herd of cattle to the Bannock diggings.

In 1865 bringing in stock was begun as a regular business, the stock coming from various states to the east, from Oregon and the southwest, and a few cattle were brought from Texas in 1866, 1867, 1868; also in 1879 and 1880.

PASTURAGE.

Agriculture is well established in the southwest part of Montana, bounded by the Idaho and the Wyoming line and an arc drawn with a radius of 125 miles from a center at Bannock City near Bald mountain in Beaver Head county. Within this section we find 45 per cent. of all the cattle and 48 per cent. of all the sheep in the territory.

Four-fifths of the pasturage of the territory in 1880 was natural grazing, and 19,000,000 acres of this were practically unoccupied. It may prove that much of this lying north of the Missouri river can be used but for a brief season on account of the severity of the winter. It is to be remembered that the showing for 1880 followed a winter when the loss in sheep was estimated throughout the territory to average 14 per cent., and that in the following winter this was increased to 22 per cent.

The average losses generally estimated before 1879–'80 were 9 per cent. For the same seasons for cattle we find losses of 12 and 17 per cent. The average loss estimated before 1879–'80 was 5 per cent. Heretofore the obstacles to stock-raising have been Indians and lack of transportation. With the comparative suppression of savage depredations and the opening of some of the finest pasturage in the northwest, especially the 2,000,000 acres in Custer county, a great impetus has been given to stock production.

In Montana there is a great extent of good average grazing. Bunch-grasses prevail in several varieties and in luxuriance. The climate is generally favorable.

The grasses general over Montana are the bunch-grasses, and those chiefly esteemed are the *Bouteloua oligostachya* and the *Bouteloua hirsuta*, the buffalo-grass (*Buchloe dactyloides*), red-top, wild rye, blue-joint, and wild oats. The white sage and greasewood are hardly known north and west of Judith valley. The grass does not grow, with the exception of that on moist or wet lands, more than four months of the year. Allowing 27 pounds of grass per day for one cow, and one-fourth of this amount for one sheep, we find that it requires about 5 tons for one cow or 1¼ tons for one sheep annually, or 15 acres for one cow or 3¾ acres for one sheep to graze upon annually; that is, they will consume all the grass on the above number of acres, but to insure their wintering without serious loss it will require double the above estimate, or 30 acres for one cow or 7½ acres for one sheep annually. A few stock-growers think this estimate too high while many think it too low. This would require a section of land for 21 head of cattle or 84 head of sheep to graze upon annually, and 756 cattle or 3,024 sheep would require one township, and 3,024 cattle or 12,096 sheep would require four townships, provided they are well watered, so that all of it can be utilized. Taking the high lands where the snow lies deep in winter, the lands that cannot be grazed at present for lack of water, and that part of the territory set apart for Indian reservation, not more than half of the grazing lands can be counted on at present.

WESTERN MONTANA.—This section of the territory comprises the counties of Missoula, Deer Lodge, and Beaver Head, an area of 20,307,200 acres, of which, owing to the extents of high rugged mountains, heavily timbered, especially in the northern portion, hardly more than 11,500,000 have available pasturage. Beyond the occupation of 1880 there are probably 2,000,000 acres, principally north and west of the Flathead Indian reservation that offer at least summer grazing. The valleys of the Kootenay and the Upper Flathead river and of Tobacco creek and Clark's fork of the Columbia have abundant grass. There is high open prairie north of Flathead lake along the Flathead and Maple rivers. The east and west sides of the lake, except on the southwest, where uneven prairies open toward Clark's fork, are on the one side rugged and abrupt to the Rocky mountain divide; on the other side rocky and covered by forests. Elsewhere, in the western section, south of latitude 47°, all the valleys and nearly one-half of the mountain sides furnish pasturage.

Missoula county, owing to its altitude, its high latitude, and its density of timber, is thinly stocked. Beaver Head, in proportion to its area, is the favorite stock county. The plateaus, terraces, and valleys of its easterly slope are drained by Big Hole creek and river and Beaver Head river, which two form the Jefferson river. The great extent of varied pasture embraces all but the most rugged elevations. In Deer Lodge county the mountains are pastured generally, but there is not sufficient winter range to complement the summer grazing. Everywhere water is abundant. The numerous valleys supply the finer denser grasses. The climate, however, is severe and variable. The southern part of Missoula county, bordering on Saint Mary's fork of the Bitter Root river, south of Missoula, and especially south of fort Owen, has mild climate compared with the rest of the territory. This southern half of this section of Montana, with Madison, Jefferson, and much of Lewis and Clarke counties, constitutes mainly the agricultural portion of the territory. The large cattle-rangers chafe under the restrictions which farming creates.

The character of the natural grazing in southwest Montana has greatly depreciated. Stockmen of the longest experience reported that a cow ranged 50 acres to find what grew on 20 acres six years ago, and on 5 acres in 1870.

The best practical authorities on pasturage show that southwestern Montana, although so recently occupied, was overstocked in 1880. Many large herds had been removed to the Musselshell, Sun river, and other northern and eastern regions. Overstocking and injury to pasturage show in a less degree on the Madison, Missouri, Beaver Head, and Missoula ranges than on the others in western Montana. The northern part of Missoula county was but sparsely occupied in 1880.

NORTH AND WEST MISSOURI COUNTRY.—This section comprises all of Montana east of Missoula and Deer Lodge counties, and west of the Missouri river, north of the Marias and Missouri rivers. It is the least explored section of Montana. Its southwestern counties, Lewis and Clarke and Jefferson, contained, early in 1880, nearly 60,000 cattle and about 49,000 sheep. These counties lie between the main divide of the Rocky mountains and the Missouri river and include some naturally good ranges—those on the rivers—also the Dearborn valley.

Between the south limit of that valley and the boundary of Choteau, Lewis and Clarke county is favored by the "Chinook" wind. The two counties and Jefferson are probably stocked to their capacity for open range, as settlements and farming have restricted the free use of the streams and natural shelter.

Going into Choteau county from Lewis and Clarke we find, from the mouth of Sun river to the crossing above the mouth of Muddy creek, a succession of established ranches and a wide spread of range, yet the country immediately about Sun river was reported to be overstocked, and the pastures appeared, as viewed along the stage route in August, to be completely eaten off. The district to the northwest up Muddy creek and over to Teton river, is properly a summer range only, and is unfit for winter occupation. Stock is driven from it to the Sun and the Missouri rivers as cold weather comes on.

All the west Choteau country south of the Marias river is of a rolling prairie character with successive table-lands up to the mountains. North and east of Marias river no stock is found, except the cattle on the Indian reservations and about the fort. From the 111th meridian eastward, north of the Missouri to fort Peck, the winters are reported by army officers to be very severe, with "blizzards" from the northwest. In the spring there are heavy but brief rain storms, driven by high winds. Of 200 oxen around Fort Assinaboine (on Milk river near longitude 110°) 80 perished for want of feed during the winter of 1879–'80. Indians and the climate are too dangerous for stockmen east of the longitude of Fort Benton (near 111°) and only buffaloes graze on the bunch and buffalo grasses.

CENTRAL MONTANA.—Madison and Gallatin counties, though so far to the south and west, lie between the Missouri and the Yellowstone. These southern counties possess a great extent of available pasturage, but the climate is severe on stock. The snows lie longer than farther to the north and east. All of Madison county and one-half of Gallatin county are in a farming country where fences have diminished the open pasturage, so that when the seasons of 1879 and 1880 came upon thin stock the losses were great. In 1880 the exodus of the larger herds had begun to the northeast; nevertheless, there were at the time of this investigation nearly 80,000 cattle and about 35,000 sheep in the two counties, the farm products furnishing winter-feed for many small herds. Passing beyond the agricultural region we come first on the northeast to the east Missouri ranges, and to the Shields river and upper Smith river, which lie between the Big Belt mountains and the Crazy mountains. This same valley, in which Fort Logan stands, widens to the Missouri river. There is a fine stretch of grazing country through from the mouth of the Shields at the Yellowstone to the mouth of the Smith at the Missouri, being nearly 130 miles long by an average of 25 miles wide. It is covered with bunch and blue grass far up the mountain sides. There were there, in 1880, 80,000 sheep and 11,000 cattle, with room, especially in the basin of the Smith, for many more. The upper and the lower valleys are separated by a cañon of some 25 miles length. The east Missouri valley is a narrow, broken pasturage, as the Big Belt mountains rise very abruptly from the river. Lying as it does on the west side of the mountains, it is exposed to storms. Stock occupation is limited to the extremities, opposite Dearborn river in the north and in the bend in the south at the mouth of the Gallatin river.

Along the Missouri, below the Little Belt mountains, are the Highwood ranges, south of Fort Benton, not grazed to their full capacity, except east of Shonkin creek, where water becomes very scarce. Cattle occupy Highwood creek, but on Shonkin and Arrow creeks and south of the Highwood mountains sheep are numerous. Their first location in this region was in 1876 on Little Belt creek. Eastward from these elevations is the superior and extensive tract of pasturage comprising the Judith valleys, and south of Judith gap is the wide spreading country at the headwaters of the Musselshell and embracing the Sweet Grass, Otter (sometimes named on the maps Medicine Bow), and Big Timber creeks, emptying into the Yellowstone in Gallatin county. In 1880 this great strip of pasturage, with the adjacent valleys, covering an aggregate of 2,750,000 acres, was sparsely occupied, except at its north and south extremities. To luxuriance and variety of grasses are added a climate comparatively favorable, both summer and winter ranges, and generally an abundance of water. North of Judith gap, near the northeast rise of the Little Belt mountains and east of the lower Judith, the snow lies heavily. South of Judith gap, and northeast of Crazy mountains, on the headwaters of the Musselshell, the pasturage is said to be always swept of snows by the northwest winds.

East of the 109th meridian, in central Montana, we find an extensive occupied pasturage tract, that of the main Musselshell river. It embraces all of the country east of the Judith and the Snowy mountains to about longitude 107° 50′. Thence northeast, nearly to the junction of the Yellowstone and the Missouri rivers, the country bears popularly the character of "bad lands", except about 30 miles in width along the Yellowstone. There was no occupation by either cattle or sheep east of the bad lands, except that on the Yellowstone there were occasionally a few animals.

This Musselshell country is very sparsely occupied, except in the south, and had no sheep in 1880 east of the 109th meridian, practically its western boundary. The chief occupation is west of the great bend and southeast of the Snowy mountains. There were in the region above the bend of the Musselshell, in the fall of 1880, 50,000 cattle.

Mr. Granville Stuart, who visited this part of the country in the spring of 1880, reported it as excellent pasturage, except on the east, close to the bad lands, where sage prevails. Down the main river, from the bend to about latitude 47°, he considered the pasturage less valuable. This tract of country has been little traveled,

and even its partially informed authorities are few. Projects for its increased occupation were stimulated by the act of July 13, 1880, restoring to the public domain all that part of the Gros Ventre, Piegan, Blood, Blackfeet, and River Crow Indians' reservation south of the Missouri.

Sheep were close in the track of the pioneer cattle. Special Agent James Heard met in September, 1880, near Virginia City, a band of 6,000 sheep on their way from Utah to the Musselshell.

SOUTHERN MONTANA.—The country south of the Yellowstone, in 1880, seemed to have almost virgin pasturage of good quality, water, shelter, good climate, summer and winter range contiguous, no fencing, and ready transportation. Until the Custer massacre, in 1876, caused the building of Fort Keogh on the Yellowstone, just above the 106th meridian, there was no safety in that extensive tract of country for stockmen. Up to 1878 the country was only occasionally traveled. Cattle came in from western and northern Montana late in 1878. We find about 30,000 cattle and over 1,300 sheep there in 1880.

The exceptions to good pasture are the high timbered mountains. As the ascent from the Yellowstone reaches 20 miles inland the valleys and plateaus begin to be clothed with grass, and this pasturage increases in height and density until rugged mountain elevations are reached or patches of timber interfere. Crossing west from longitude 107°, on a line parallel with the Wyoming boundary, and 25 miles north of it, a succession of rich valleys and closely-grassed hills and bench-lands reach west to the Yellowstone valley north of the National Park. On the valley sides wild vines and bushes abound, with plums, berries, grapes and hops; and the country is well watered. In the larger streams, as the Big Horn and the Yellowstone, there are often places where stock can drink. Elsewhere are water-holes and warm springs favorable for winter ranges. West of the Big Horn the climate is more severe than below that river eastward to the Powder river range. Special Agent Heard was able to locate in the southern section west of Fort Keogh the following list of cattle in September, 1880: About Fort Keogh 400 ranch stock and 300 Indian cattle; about mouth of Rosebud river, 550; between that and the mouth of Big Horn, 250; in neighborhood of fort Custer, 800; Terry's landing, 260; on Pryor's creek, near the Yellowstone, 1,100; between Pryor's creek and Stillwater, 530; Stillwater country, 300 Indian stock, and about 1,000 head more, here and there distributed in small herds throughout the western Crow reservation; a total in the southern section southwest of Fort Keogh of between 5,450 and 6,000 cattle, with no sheep. About the river settlements there were some farms. At Coulson, west of Pryor's river, an irrigating ditch, two miles long, watered a thousand acres of land.

In the section south and east of Fort Keogh, south of latitude 46° 30′, and east of longitude 106° 45′, an account was taken of the stock held in October and November, 1880. The count was 24,980 cattle and 1,350 sheep. With the exception of 5,739 cattle along the little Missouri river and 933 on Pumpkin creek all the neat stock occupied the ranges of Tongue river down to its mouth. Two flocks only, of about equal numbers, of sheep were near the Yellowstone, 14 miles east of Miles City, and on the Tongue, 25 miles south of the Yellowstone. Between the Yellowstone river, from the mouth of the Rosebud to the mouth of the Powder at the north, and the Wyoming boundary (latitude 45°) from Dakota to longitude 107° at the south, is an area roughly computed at 4,000,000 acres. It contains 3,500,000 acres of what in 1880 was good pasturage. The soil along Powder river, from its sources to the Yellowstone, is a wash from heights of the Big Horn mountains, which, where the Powder river rises, are of a more friable character than farther north. The grasses, luxuriant and nutritious, are easily pulled or trampled out by stock, while water is scarce except in the main streams. The soil about the sources of the Tongue river and down its whole extent is coarse and strong. The grass on this soil was not easily trampled out, and it held the roots well.

Mr. Masi found what he calls the "mud" drift along and eastward of Powder river. A short time after the close holding of a body of cattle over night the grass was entirely eaten off and the roots destroyed—pulled out. On another spot, on the Tongue river, where the same herd had been held for several days, though the grass was eaten close to the ground the roots were intact.

The best pasturage found was on the Tongue river southwest of the Wolf mountains cañon and between Powder river and Crow creek for 20 miles above the mouth of Crow creek. The region as a rule is a rolling, bluffy country, descending to the north; the uplands clothed with bunch and buffalo grasses, the meadow strips with the bottom grasses.

The Tongue river for 5 miles on each side and all the way down from the Wyoming line, except where broken by the Wolf mountains, is taken up by ranches. Through the Wolf mountains cañon the river is about 300 feet wide. There are some pines in the mountains, but generally the timber on the river is cottonwood, ash, and willow.

Between the Tongue and the Rosebud the rolling country presented good pasturage, unoccupied save by buffaloes. Farmers have settled along the lower part of the Tongue and for several miles east and west of its mouth. The uniform report was that cattle would winter well without feed, notwithstanding the severe experience of 1879 and 1880, but during the winter previous to this examination there were only half a dozen stockmen located in the country beyond the settlers near the Yellowstone river, with a total number of less than 500 cattle. All others had come in during 1880.

There is generally enough timber for building and coal for fuel. The eastern slopes of the divides are least broken, but snow was found on that side when there was none on the west slopes. Powder river, near the mouth of Crow creek, is about 350 feet wide. Oak and pine were found more abundant on Thompson's creek and the little

Missouri river than elsewhere in southeast Montana. The immediate valleys of the Tongue, Powder, and little Missouri were evidently farming lands. Gardens and fenced fields were seen in a few instances that had yielded well in their first year's cultivation. The mountains about the head of Tongue river are covered with pines. On the Powder river mountains the pine is generally scattered here and there in small groves. On the bluffs about the little Missouri are scrub oaks and some pines.

CATTLE.

Owing to the comparatively small number of Texas cattle brought into the territory and the wide attention given to the improvement of stock, Texas characteristics in Montana stock are scarcely observable. Montana had no surplus until 1875–'76, and she has never sent out any cattle except beeves, the quality of which is good.

The management of cattle in the territory is illustrated by that between the east base of the Rocky mountains and the Missouri river, southwest of Fort Benton. This is a range of about 100 miles long by 50 miles broad, occupied by 15,000 cattle and 7,500 sheep, in round numbers. The range is held simply by first occupation. The forage plants are the bunch-grasses, grama, buffalo, and blue-joint. The wild parsnip is also found, sometimes fatal to stock in early spring. Most of this country is well watered, but there are parts useless for range though abundantly grassed. One ranchman holds a few over 3,000 cattle, and his investment in buildings, fences, vehicles, harness, tools, horses, etc., aside from the herd, is estimated at $2,500. He has bred Oregon cows to shorthorn bulls, the calves averaging 72 per cent. from cows three years old and upward, and 40 per cent. from two-year-old heifers. His three-and-a-half-year-old beeves sold for $28 and averaged 1,300 pounds live weight. All the stock-owners of that district work together in "rounding-up", marking, and branding, employing permanently one man to every thousand head.

The work of the range requires the labor of fifteen men for an aggregate of three months. For the rest of the year three men are employed to ride the outer lines of the range. The labor expenses, at $40 per month including board, amount to $2,880; taxes would be about $3,000; with sundries, we may call the total expenses on the 15,000 cattle, $6,000. There are generally two "round-ups" during the year, about the last of May and the first of November. The stock are moved at the time of the first "round-up" to summer pasture and returned to winter range after the fall "round-up". Those are the times for branding and for picking out beeves.

DISEASES.—The only serious disease known among cattle in Montana is the "blackleg", and in 1880 that seemed to have nearly subsided after prevailing from three to five years, some say much longer.

The estimated average value of cattle on the range in Montana in 1880 was: For bulls, $40; for cows, $17 50; three-year-old steers, $24; two-year-olds, $19; yearlings, $14; calves, $9; and beeves, $30.

The estimated average live weight of three-and-a-half-year-old grass-fed Montana steers in 1880 was 1,125 pounds; dressed weight, 595 pounds.

The composition of certain ten herds of Montana cattle in 1880, aggregating 18,952 head, was: 189 bulls, or 1 per cent. of the whole; 6,427 cows, or 34 per cent.; 1,895 beeves or 10 per cent.; 2,664 two-year-olds, or 14 per cent.; 3,612 yearlings, or 19 per cent.; 4,165 calves, or 22 per cent.

Estimated number of calves dropped per 100 cows was 80; of these 65 survived to yearlings.

There is an estimated annual loss among Montana cattle over twelve months old of about 5 per cent., arising from the following causes: Winter and spring storms, Indian depredations, snake-bites, theft, and poisonous weeds.

The losses among cattle over twelve months old in the winter of 1879–'80 were very severe; train cattle just driven in suffered most. From information received during the preparation of this report we learn that the losses of the winter of 1880–'81 were even more severe than in the previous year. The average loss among cattle in 1879–'80 was from 15 to 20 per cent.

SOUTHWEST MEAGHER COUNTY.—The losses among cattle were 15 per cent. and over.

SUN RIVER.—In this section the reported losses among native stock were 5 per cent.

DEER LODGE COUNTY.—The reports of losses among unacclimated cattle are from 10 to 15 per cent.

MUSSELSHELL VALLEY.—Very heavy losses; about 15 per cent.

GALLATIN VALLEY.—Losses 25 per cent.; most severe winter in ten years; among acclimated cattle the loss was about 10 per cent., but much greater among trail cattle.

HIGHWOOD MOUNTAINS and north of Highwood mountains there was no unusual loss.

SHEEP.

The census for 1870 reported 2,024 sheep. Between 1865 and 1870 small lots had been occasionally brought in for mutton from Oregon, Idaho, Nevada, Utah, and California, mainly from Oregon over the Mullan road, and some by the way of Boisé City. From 1870 the business made rapid advance. The stock was a mixture of merino, cotswold, and southdown, bred on the original Mexican stock.

The season of 1879–'80 was very disastrous, but it now appears to have been even worse in 1880–'81. We find that over 136,000 sheep entered the territory during 1880, and for 1881 the number is reported to be still greater.

The following outline indicates the conduct of sheep husbandry in Montana: One flock numbers 5,000 of graded stock, three-quarters bred, located on the Smith river, in Meagher county. They are estimated as worth

$15,000. The investment in "outfit": 640 acres owned, $800; buildings and fences, $1,500; equipment in vehicles, harness, tools, etc., $750; horses and dogs, $750; total outfit, $3,800; add $200 for sundries unnamed, and we have a grand total investment of $19,000. In addition to the above are 20,000 acres "free range".

There are three men employed throughout the year at $40 per month each. For extra labor in lambing time there are four men for six weeks at $40 per month, board included in both instances; 3,750 fleeces are sheared at 10 cents per fleece. The year's bill of labor is therefore $2,055.

The sheep are permanently divided into two main flocks, the rams and wethers in one, the ewes in another. This general division is followed by another for the summer, when the rams are herded by themselves, the wethers by themselves, and the ewes and lambs with them subdivided into two flocks of nearly equal size, about 1,800 in each. This arrangement permits room and selection in grazing. Other divisions are made temporarily for lambing, shearing, etc.

In the plan of management the range is allotted to summer and winter pasturage, according as the country naturally offers shelter and grasses, and according to the peculiar requirements of each flock. A corral stands on each remote range for nights or for emergencies. The home corral is for lambing and shearing, and a chosen portion of prairie or meadow is retained for cutting hay. Each herder has special charge of a flock. When the lambs are weaned they are put with the wether flocks, and about the last of November the rams are turned in with the ewes. For this service on some ranches the rams are fed with grain. During the last of April lambing begins, when the ewes are carefully held and cared for to provide for weaklings and twins and to defend them in case of severe storms or from the depredations of wild animals; shearing is done in June; after that comes hay-cutting. The lambs are castrated when a week or ten days old. Sheep are grown essentially for wool. A few four-year-old wethers are sold when there is a demand from some neighboring town or garrison for mutton.

Medium rather than fine-wooled sheep are considered most profitable. The wool is remarkably free from burrs and dirt. Some shelter and hay is provided for winter. Fresh pasture is preserved for ewes about to lamb and for the young lambs. Shearing is done without previous washing, and "dipping" follows shearing.

The average annual loss among adult sheep during a term of years is 9 per cent., made up of disease, winter and spring storms, wild animals, snake-bites, and poisonous weeds. No other disease is so prominent as scab, which causes great damage to sheep and to wool, and is introduced anew each season by sheep driven into the territory. Grub in the head and dropsy are also sources of limited loss.

From reports of stockmen the winter of 1879–'80 was the most severe ever experienced and very disastrous to stock interests, the winter setting in unusually early and spring opening very late. More sheep were lost after the 15th of March than during winter, on account of there being no new grass.

MEAGHER COUNTY.—Out of 5,200 head of sheep over 80 per cent. perished, due to their being emigrant and diseased.

GALLATIN COUNTY.—Loss among sheep 10 per cent.

DEER LODGE COUNTY.—Losses severe among emigrant sheep.

The estimated average value of sheep was, for rams, $28; for ewes, $3; for wethers, $3 25. The average weight of mutton-sheep was, live weight, 105 pounds; dressed weight, 52 pounds. The annual wool clip was estimated to be, rams, 10 pounds; ewes, 5 pounds; wethers, 6 pounds; lambs, 4 pounds.

The composition of five flocks of Montana sheep actually investigated, aggregating 22,829 head, in 1880, was: 260 rams, or 1 per cent. of the whole; 9,150 ewes, or 40 per cent.; 8,200 wethers, or 36 per cent.; 5,219 lambs, or 23 per cent.

Estimated number of lambs dropped per 100 adult ewes, 80; of these 57 survived to yearlings. The average percentage of loss among adult sheep was 14 per cent. The low percentages of lambs dropped and surviving and the great mortality was in consequence of the severe winter of 1879–'80; trail sheep suffered most, their loss being from 25 to 33 per cent., on account of their poor condition.

MOVEMENT OF STOCK.

Heretofore cattle and sheep have been moved by drives, except a few since 1878 by steamboat on the Missouri.

In 1880 cattle were brought from the states of Oregon and Texas and from the territories of Washington and Utah; sheep were brought from Oregon, Washington, Idaho, and Wyoming.

To the British possessions 3,000 cattle were sent; to Cheyenne, Pine Bluffs, and Sidney, on the Union Pacific railroad in Wyoming, 20,000; and to Bismarck on the Northern Pacific railroad in Dakota, 7,000, to ship eastward for slaughter, a few to go to Iowa and Illinois for feeding; and 1,500 were sent from Fort Benton by steamboat—an aggregate of 31,500 head.

Of cattle driven into Montana, 10,000 were from Washington territory; 16,725 from Oregon, of which 8,725 were driven to Custer county; 900 from Utah; 15,000 from Texas; 3,775 from Wyoming to Custer county; aggregating 46,400 head. There is a large consumption at the Indian agencies.

The shipment of beeves down the Missouri river to Bismarck began in 1878, when not over 100 head were carried by the steamboats for local consumption in Bismarck, then the outfitting point for the Black hills. In 1880 1,150 head of beef-cattle were transported from Fort Benton to Bismarck for shipment by rail to Chicago.

In 1880 Montana received 2,400 more cattle than she sent out, and received 104,500 more sheep than she sent out, as estimated. The trails in the west and southwest are by the Mullan and Bannock passes; by the latter to the Union Pacific railroad. In the southeast the trails are through Custer county. On the east they follow the Missouri river.

The drives from northwest Montana, east of the Rocky mountains, were formerly along the Missouri river if destined to the Northern Pacific at Bismarck; or, if southeast, across to the Yellowstone and then by the Big Horn or Tongue and Powder river trails to the Union Pacific railroad at Cheyenne, Pine Bluffs, or Sidney. Now they need go in that direction only as far as the Yellowstone tracks of the Northern Pacific road. Those drives are estimated to cost for 2,000 cattle by either trail about $2 per head, the distance being about 500 miles. The shrinkage from range to Chicago is about 10 per cent. For a drive of 2,500 head, traveling 500 miles, there would be needed twenty men, averaging $40 per month each for wages; two wagons; forty horses; provisions forty cents per day for each man, and stores allowed for sixty days; camp and road outfit of ax, shovel, pick, tools, cooking and mess articles, and arms. The cooks drive the wagons. The distance traveled averages 10 miles per day, varying according to the supply of water. The start each day is at daybreak, the stock feeding as they move. A halt is made at noon for dinner. The camp is made at night in time to allow time for grazing before the cattle should lie down. They are herded in a close bunch by two men, a change and guard for this service being made at midnight. A count is made at each start. When the cattle are "broke to the road", one man and two or three horses to the man suffice to about each 250 head. The wagons are coupled with five yokes of oxen or three spans of horses. Drives into the territory from the west should not exceed 2,000 head each, because of the scarcity of water on both routes.

The following particulars of two sheep drives from California into Montana, during 1880, were gathered from the men who conducted the drives:

The first numbered 10,000, from Kern county, by the following general trail: Bakersfield over the Sierra Nevada, by Walker's pass; thence up Owen's river to White Mount peak, and across the desert to Eureka; from Eureka on a direct line to Wells on Central Pacific railroad; from that point they skirted the base of Goose Creek mountains, and struck the trail to Pont Neuf river, and thence on to Taylor's bridge; after that they followed the line of the Utah and Northern railroad to Camas; thence by Bannock pass to Helena, Montana. The journey of about 1,500 miles consumed five months, during which 600 head were lost. The drive was estimated to cost 47½ cents per head. The sheep cost in California $1 50 per head, and were worth in Montana from $2 50 to $3.

The second drive was of 5,000 sheep, also from Kern county, California; but from Bakersfield they went to Havilah, in the same county; thence to Big Pine, and through Nevada via Alida springs and Tybo, north of the desert, by Ruby valley on to Wells; from the Central Pacific railroad they struck over to Bonanza bar on Snake river, then on by Ross fork to Eagle rock and Medicine Bow pass, through Bannock pass to Helena. The latter drive, its conductor claimed, was nearly 300 miles shorter than the former, and a better trail. The time of the drive was two weeks less than the other, but the expense was put at 50 cents per head.

A firm drove about 30,000 sheep from California to Montana in 1878, but, becoming dissatisfied with the country, turned south again in 1880 with 32,000 head, and located in Apache county, Arizona, having driven by the Mormon trail through Utah, as was learned direct from the mayordomo at their camp in Arizona.

There were driven in from Washington territory during 1880, 3,000 sheep; from Oregon, 25,000; from California, 72,000; from Nevada, 10,000; from Utah, 5,000; from Idaho, 20,000; from Wyoming, 1,500; aggregating 136,500 head. Those from Idaho were sheep from California and Utah trail, wintered in Oneida county, Idaho.

SUMMARY OF CATTLE AND SHEEP BROUGHT INTO CUSTER COUNTY, MONTANA TERRITORY, DURING 1880.

Whence driven.	Cattle.	Sheep.	Range of the stock.
Total	22,500	1,000	
Oregon	625		Prairie Dog fork of Tongue river.
Oregon	8,100		Main Tongue river.
Wyoming	1,510		Do.
Wyoming	1,200		Otto creek fork of Tongue river.
Wyoming	865		Pumpkin creek fork of Tongue river.
Wyoming		1,000	Main Tongue river.
Wyoming	200		Little Missouri river.
Texas	*7,000		Main Tongue river.
Texas	3,000		Little Missouri river.

* With this herd about 280 Kentucky graded shorthorn bulls were ranged.

The report as given for Custer county east of the Rosebud river and south of the Yellowstone is a tally of the stock brought in during 1880 for breeding purposes.

ESTIMATED CATTLE, SHEEP, AND SWINE IN MONTANA TERRITORY AS REPORTED FOR CERTAIN YEARS.

Year.	Authority.	Cattle.	Sheep.*	Swine.
1870	Ninth Census (on farms)	36,738	2,024	2,509
1873	Strahorn's Resources of Montana territory	86,944	10,597	.....
1874	....do	102,058	18,947	.....
1875	....do	118,603	20,790	.....
1876	....do	143,317	51,558	.....
1877	....do	182,659	80,000	.....
1878	....do	250,000	200,000	.....
1878	Auditor's and treasurer's report	210,457	101,361	6,439
1880	....do	274,316	249,978	9,664
1880	Tenth Census (on farms)	172,387	184,277	10,278
1880	Tenth Census (on farms and estimated unenumerated ranch and range stock)	428,279	279,277	15,190

ESTIMATED NUMBER OF CATTLE, SHEEP, AND SWINE IN MONTANA TERRITORY JULY 1, 1880.

Sections.	Sections defined.	APPROXIMATE ACREAGE OF STOCK OCCUPATION.		STOCK.		
		Cattle.	Sheep.	Cattle.	Sheep.*	Swine.
	Total	38,000,000	27,500,000	428,279	279,277	15,190
Western Montana	West of the Rocky mountains and the west boundary of Madison county, comprising Missoula, Deer Lodge, and Beaver Head counties.	9,500,000	6,500,000	92,149	88,691	6,030
North and west Missouri country.	East of the Rocky mountains to the east and south Missouri river boundary; comprising Jefferson, Lewis and Clarke, and part of Choteau and Dawson counties.	7,900,000	5,500,000	116,804	50,481	3,330
Central	Between the Missouri and Yellowstone rivers, comprising Madison, Gallatin, Meagher, and part of Dawson, Choteau, and Custer counties.	18,800,000	14,000,000	188,526	138,857	5,700
Southern	South of the Yellowstone, comprising about three-fourths of Custer county	1,800,000	1,500,000	30,800	1,248	130

*See note to Texas tables, p. 31.

Total land area of territory.....acres.. 92,998,400
Total area of approximate available pasturage.....do... 68,500,000
Total area of unoccupied available pasturage.....do... 30,500,000
Total population..... 39,159

AVERAGE DENSITY OF STOCK (CATTLE AND SHEEP) OCCUPATION.—Making one head of neat stock the unit of stock, and considering five sheep to equal one head of cattle in relation to consumption of pasture, we have 484,134 units of stock occupying 38,000,000 acres, or 78.49 acres to the head.

CALIFORNIA.

HISTORY.

The name California was once applied to most of the western coast of North America. The region now embraced under that name received little attention for many years after it was first visited by Europeans, who touched at various points on the coast in the sixteenth century. The settlement of upper California was the work of the Catholic missions under the Franciscans, in 1768, who took with them 200 cattle, and formed the first white settlement at San Diego in that year. According to traditional account there were 200 cattle and 100 sheep in the southern part of what is now San Diego county in 1769.

The missions gradually extended their possessions, bringing the Indians under their control, and forming almost the whole civilized influence in the territory as Spain and Mexico governed it, until the culmination of their wealth about 1834.

The government at that time had four presidios or garrison stations in the territory, at each of which were cattle aggregating several thousand. Private individuals owned some cattle, but so few as not greatly to affect the aggregate.

In 1778 the mission books show that there were 500 cattle in California. In 1800 there were, as reported, 7[illegible],000 cattle and 88,000 sheep. In 1830 the Mexican government had granted some forty ranches to private parties, not more than half of them occupied, however. (*a*)

a The library of H. H. Bancroft, esq., San Francisco, contains a valuable collection of original manuscripts on the early history of California, to which access was very kindly allowed to gather data for this report.

In 1833 the secularization of the missions, toward which legislation had been tending for some years, was fairly inaugurated, although the measure was not actively pressed till 1836. In the next few years the missions were essentially stripped, the Indians were scattered and wasted away, and the cattle were swept off.

The padres, when convinced of the speedy enforcement of the recent promulgations of Mexico relative to the missions, endeavored to save as much as possible from the wreck. With nothing to hope for, and but a limited time in which to act, a general slaughter of cattle for the hides took place. The slaughter was conducted in the most expeditious manner possible.

Administrators were placed in possession of the remnant of property left in the missions, and their effects were conceded by the general government to establish a fund from which to meet the expenses of the local government.

The following table and summary (*a*), from the work of an observant traveler, present sharply the great development of material interests, including live-stock, attained by the mission fathers, and the sweeping destruction in abolishing mission rule:

TABLE COMPARING THE TWENTY-ONE MISSIONS IN CALIFORNIA UNDER THE RELIGIOUS ADMINISTRATION IN 1834 AND UNDER THE CIVIL ADMINISTRATION IN 1842.

Names of missions.	Cattle.		Horses, mules, and asses.		Sheep, swine, and goats.	
	1834.	1842.	1834.	1842.	1834.	1842.
Total	423,000	28,220	61,600	3,800	321,500	31,600
San Diego	12,000	20	1,800	100	17,000	200
San Luis Rey	80,000	2,000	10,000	400	100,000	4,000
San Juan Capistrano	70,000	500	1,900	150	10,000	200
San Gabriel	105,000	700	20,000	500	40,000	3,500
San Fernando	14,000	1,500	5,000	400	7,000	2,000
San Buenaventura	4,000	200	1,000	40	6,000	400
Santa Barbara	5,000	1,800	1,200	160	5,000	400
Santa Inez	14,000	10,000	1,200	500	12,000	4,000
La Purisima Concepcion	15,000	800	2,000	300	14,000	3,500
San Luis Obispo	9,000	300	4,000	200	7,000	800
San Miguel	4,000	40	2,500	50	10,000	400
San Antonio	12,000	800	2,000	500	14,000	2,000
Soledad	6,000	.....	1,200	.....	7,000	.....
Carmelo	3,000	.....	700	.....	7,000	.....
San Juan Bautista	9,000	.....	1,200	.....	9,000	.....
Santa Cruz	8,000	.....	800	.....	10,000	.....
Santa Clara	13,000	1,500	1,200	250	15,000	3,000
San José	24,000	8,000	1,100	200	19,000	7,000
Dolores de San Francisco	5,000	60	1,600	50	4,000	200
San Rafael	3,000	.....	500	.....	4,500	.....
San Francisco Solano	8,000	.....	700	.....	4,000	.....

In the following summary of the preceding table the addition of the number of Indians, and of hectares cultivated in cereals, emphasizes the view of the destruction wrought:

SUMMARY.

	Under the religious administration, 1834.	Under the civil administration, 1842.
Indians	30,650	4,450
Neat cattle	423,000	28,220
Horses, mules, and asses	61,600	3,800
Sheep, swine, and goats	321,500	31,600
Cultivated in cereals, hectares *	70,000	4,000

* The hectare equals 2.471 acres.

As held by the missions and afterward by the Mexicans the stock itself had but little commercial movement. The immense herds supplied the small local demand for beef, and later there was some driving of bulls to Mexico. Otherwise, cattle were slaughtered for the hides and tallow.

Such was the condition till by the treaty in 1848, after the war with Mexico, California came into the United States. Shortly afterward the discovery of gold turned a tide of migration from the older states, accompanied

a Exploration du territoire de l'Oregon, des Californies et de la mer Vermeille, 1840, 1841, 1842. M. Duplotde Mofras. Tome premier, pages 320–321. These figures are as printed in Mofras, with some undetermined error of detail in columns 1 and 3.

almost from the first by working cattle. A demand for eastern stock cattle then arose. At first these were inferior in size and appearance to the best California cattle, but after 1852 good cattle came in rapidly from the states. In 1855–'56 cattle began to enter southern California from Texas. This drive up to 1871 carried in all perhaps 75,000 cattle. In 1870 and 1871 three droves of Texan cattle came in by way of the Rocky mountains and Humboldt river. Since 1860 Oregon cattle have entered California. Almost all the latter were for slaughter. The year 1862 was the height of California cattle production, when there are estimated to have been nearly 3,000,000 head ranging in the state. In 1864 the terrible drought forced out or destroyed great numbers. In the years since 1852 the frequent introduction of blooded bulls has so graded the California stock that the native type is now uncommon. In southern California, principally in San Diego county, the California blood is still to be recognized, but there are now very few California or Texas bulls to be found, except in the mountains, where they have run loose for years, and must be pursued as wild animals.

The filling up of the country with permanent settlers has gradually developed the agricultural capabilities of considerable portions of the state and given prominence to farming. The pastoral life which occupied large tracts for cattle and sheep, with a sparsely settled country and comparatively limited production, has mainly passed away under the new order of things.

The "no-fence" law marks an important phase in the transition of cattle interests in California. It was first agitated in 1861, at the suggestion of Governor Downey, and was first tried in one of the central counties, since which it has been generally adopted.

The cattle driven to California in 1880 were mainly from Nevada, Oregon, Idaho, and Utah, in the order named as regards importance. They came principally for slaughter, though many are pastured or fed for a time. The import by sea was insignificant.

With a holding of over 800,000 head, consumption exceeds production. California sends out some young stock for Arizona, Sonora, and lower Colorado. Though she has only 27 per cent. of the number of neat stock held eighteen years ago, yet, because the business is pursued in a different way, and the quality of the production is greatly improved, the results are now probably more profitable to the state as a whole and to most individual proprietors than they were in 1860–'62. The memorable drought of 1863–'64 compelled cattle-raisers to adopt a more provident mode of administration and promoted improved breeding. A few men had begun fencing when lands were cheap, and years before the law gave protection to farmers and shepherds. By such foresight fortunes have come to some of the present large cattle-raisers of California. The advantages to cattlemen have been that they now apportion their stock to the capacity of their pastures; that they can both pasture and feed; that they preserve valuable bulls to the service of their own cows; that, not ranging at will, the cows are more apt to breed; that the stock, escaping rough handling, become gentle, carry their calves safer before birth, and care for them better when born, and the calves themselves, protected and not being branded until two months or ten weeks old, do not suffer as those do that are on open range. Finally the stock, traveling less for feed, take on flesh of a better quality and in a shorter time. Not a successful cattle-raiser in the state was found who did not approve of this change in the business, whether or not he condemned the law which forbids the turning loose of neat cattle. To-day very few large herds in California are grazed on the public lands outside of fence. The principal exceptions are in Kern, San Bernardino, and San Diego counties. The firm owning the largest number of cattle in the state holds by purchase 800,000 acres of land, at an average purchase cost of $6 per acre, of which 500,000 acres are fenced. The best of that land will support all the year a bullock to every 3 acres, and the best grazing of the San Joaquin plains will carry a bullock to 10 acres. In Los Angeles county it was claimed that the Los Cerritos ranch would sustain one bullock to every 3 acres, and 22,000 acres of that property were grazing 1,400 cattle and 22,000 sheep in the fall of 1880. The average valley land of the same county will, it is believed, carry on an average one steer to every 5 acres in ordinary years.

The Santa Margarita ranch in San Diego county is a property of 133,440.75 acres, and was one of the large Mexican grants. In the administration of the present owner are found preserved in modified form the traditions, manners, and business customs of the old Mexican ranch.

The tenure of land has been changing from free ranging to ownership or lease, especially since 1870. There is but little good government land now to be had in California. Much land has been secured on soldiers' warrants. Other lands which have been purchased largely are the swamp and overflowed lands of the state, which have cost, with perfecting of title, $1 per acre; university grants, at $6; school warrants, $1 25; those of individuals holding Mexican grants, and speculators and capitalists who cannot carry their lands profitably. There are cattle-men who have paid $25 per acre for land in large bodies, and some large pastures for feeding on drives to market have cost $100 per acre. In Central California the land is generally fenced. In the south, especially in Los Angeles county, almost all the lands of value for stock-raising are covered by Mexican grants. In the same county, and farther east, the Basques lease land at an annual average of 30 cents per acre. Where ranges of the public lands, which, as already stated, are comparatively limited, are held, the tenure is by "corralling" the water, that is, taking up all the sources of water upon the range, and in this way preventing intrusion, as the adjacent country is tributary to the water privileges. This method has marked illustration on a great estate in Kern county, where 200,000 acres are owned, containing all the available water of over 500,000 acres. The subdivision and sale of the valuable

agricultural lands of the larger ranches all through California is a feature of the times. The portions considered too valuable for stock-raising are sold to farmers. The probable average value which cannot be profitably exceeded for cattle-raising is an annual rent of $6 per acre.

The difference in the weight of cattle of the several classes of yearlings, two-year-olds, three-year-olds, and beeves of 1855 and 1880, gives an average of nearly 200 pounds in favor of the latter, both being taken from grass without other feed or care.

Marin, Siskiyou, Sonoma, Humboldt, Modoc, and Lassen are the leading cattle counties of northern California, Marin, the smallest county, having 30,000 head, and each of the others owning over 25,000. In central California, San Luis Obispo county leads, with something over 42,000; Fresno, Kern, and Sacramento follow; then come Monterey and Santa Clara, each of the latter having a few over 24,000. Southern California has two counties, Santa Barbara and Los Angeles, averaging a little over 19,000 head of neat stock. These county holdings of cattle are named without reference to area.

PASTURAGE.

Of the area of California (99,827,200 acres) about 30 per cent. at least are estimated to be unavailable for pasture. In the northern section mountains, forests, and rugged or barren portions reduce the area about 3,000,000 acres. Central California has, beside its unavailable high mountains and forests, nearly 5,000,000 acres of desert. In southern California there are 21,000,000 acres useless for stock purposes.

In the mountainous counties of the northern section, between the 39th and 41st parallels, with the exception of the eastern portion of the valley of the Sacramento river, we find that there is but one head of cattle to more than 100 acres of range, while over much of the same country there is but one sheep to each 10 acres. In the Sierra Nevada the number of cattle is very small to the acreage, and sheep are comparatively numerous. In the rugged districts of southern California we see the same thing. In the three counties of Santa Barbara, Ventura, and Los Angeles there are about 1,000,000 sheep and only 42,000 cattle. For the entire pasturage of the state, if we assume that five sheep represent one cow, we find in 1880 over 35 acres of grazing to every head of stock. Except the desert portions, Amador, Alpine, and Del Norte are the counties having the least stock of either kind, while Sacramento, in proportion to area, has the most. Of Alpine county it is to be noted that its grazing, generally available only in summer, is occupied and exhausted by stock driven from Douglas and Esmeralda counties, in Nevada. The same is true of parts of Mono county. Southwest of a line drawn from the extreme northern point of Butte county to about the intersection of latitude 35° and longitude 119° it is believed that an average of 25 acres will permanently sustain a head of cattle and 5 acres will sustain a sheep. In Humboldt and Mendocino counties authorities stated the grazing capacity at 7 acres per head for cattle and 2½ for sheep. In Tehama county no calculation was heard to exceed 15 acres per head for neat stock and 3 for sheep. West of the Sierra Nevada and in central California the extreme opinions were from 3 acres per head on the best pasture lowlands to 50 acres of mountain and prairie, while the usual statement was from 5 to 20 acres per head as the grazing capacity for cattle, and a corresponding amount for sheep. These estimates included southern and central California.

CATTLE.

FENCED PASTURE (SANTA CLARA COUNTY).—The courtesy of the owners permitted a careful study of their methods in the management of neat cattle under fence at the Bloomfield ranch, Santa Clara county.

Cattle-raising at this ranch is conducted wholly on ranges owned, fenced with redwood posts and pine boards, such pastures ranging in areas from 100 to 20,000 acres, and comprising hill, valley, and bottom-land pasturage.

By confining the herds under fence it is claimed that, without pampering, the cattle have been so far tamed that they are handled more readily and by fewer herders, breed more certainly, and keep in better flesh than when on the open range; statements which were abundantly verified. Beef-cattle from the fenced ranges are fed in feed yards, and to a limited extent stall-feeding is practiced. Stock-cattle are held on the hill pastures during winter and spring, say from the first rains (the last of November or first of December until June), when they are removed, or, if the pastures embrace both hill and lowland grazing, they move themselves to the healthier, fresher, and greener grasses of the valleys and bottom-lands in the summer. It is not the intention of the owners to feed dry cattle on the ranges in winter, but extensive provision is made to help through the coldest weather such cows, calves, and weaker young stock as need it.

An immense tonnage of hay was thus fed out in the winter of 1879–'80, and many weak cows and yearlings were carried successfully through that hard season. In the management of the cattle inside of pastures it was stated that judicious care is necessary in the disposition of herds to different pastures, and that periodical change of herds to new grazing lands is often beneficial, even if the feed offered is in no way superior to that previously ranged over. In preparing beef-cattle for market this has to be closely considered, and watchfulness in noting the improvement and falling off of herds of beeves and constant attention to their need in a change of feed are important.

Having used thoroughbred and high-grade bulls for twenty years, Miller & Lux have now but few cows of the old California type, the majority being well improved cattle, while many of the present beeves are three-fourths

and seven-eighths shorthorn and Devon stock. The average stock is graded as high as they consider desirable, since they regard further grading as involving too much care and not profitable when cattle are ranged in large herds.

All these favoring causes have allowed a branding of 90 per cent. of calves on the Bloomfield ranges during temperate years, while in the less favored ranges of Kern county one of the proprietors states that he has only secured 60 per cent. of calves. During seasons when the stock are not actively handled, a vaquero to each large pasture or to several small ones is sufficient to watch the herd inclosed in that particular field, and by a daily round on horseback he looks after the security of the fences and the welfare of the herd under his charge. About April 1, a general branding is made, when additional vaqueros, under a mayordomo, work the different herds in the pastures, corraling and branding the spring calves. From that time on, until November 30, at intervals of six weeks, such calves as are dropped are marked and branded, no calf being handled until old enough to be vigorous. Beef-cattle are turned off at all seasons, either from the range or from the feed-yards of the ranch, but the purely grass-fed cattle are usually marketed from February until July, when the natural pasturage is dry and will no longer fatten cattle for market.

Beef-cattle from the ranch are placed in a few hours in the slaughter-yards of San Francisco direct from the pastures, the Southern Pacific railroad furnishing the means of transportation. From some of the pastures beeves are driven to San Francisco, the owners having secured pastures at the necessary points for holding and grazing the cattle over night. The magnitude of the business conducted by these gentlemen prevents any detailed presentation of the expenses required by their cattle husbandry alone. After the year's marketing of beef, the firm was pasturing on the several ranches upward of 40,000 head of cattle and 90,000 head of sheep. The care of this immense stock, with the attendant grain and hay-raising interests, employed 100 men throughout the year—a force increased at times of branding, moving cattle, and sowing and harvesting crops.

To pasture this stock they own areas of land covering 800,000 acres, of which 500,000 are inclosed with fencing, no public land being used for grazing, although some leased pastures are occupied. No saddle-horses are bred on the ranches, only work and driving animals; all others being purchased in the southern part of the state, the type nearest the old native stock being preferred in the running of cattle. The class of beeves fed are usually graded shorthorns or Devons, and are made to take on 200 to 300 pounds of flesh by a course of heavy feeding with barley, oat and wheat hay, oil-cake, and grain, either barley or oats. Pumpkins are largely used in the fall. During years favorable to stock, on the Bloomfield ranch, 2½ per cent. is the loss ascertained by actual tally of the stock; and such losses are attributed to exposure to winter storms, wild parsnip, green clover in spring, and big jaw. Fencing, which assists domestication and allows of a better surveillance and care of stock, curtails the annual losses among cattle.

UNFENCED RANGE, THE TEJON RANCH.—Cattle-raising on an open range is now no longer the general practice in California. A visit of several days' duration to the Tejon ranch, through the kindness of the gentleman in charge, offered opportunity to obtain accurate record of their conduct of the business.

The Tejon ranch of General E. J. Beale, including the Tejon, Castac, Liebra, and Alamos grants, comprises 200,000 acres of land in private ownership, which contains all the available water to control 300,000 acres of public land. Originally covered by Mexican patents, this ranch since 1845 has been variously stocked at different intervals with cattle; in 1865 with sheep. These in 1870 numbered 96,000 head. In 1879, a long lease having expired and General Beale again coming in direct control, he purchased more cattle, and gradually disposed of the large sheep business of the estate. At the date of this investigation (1880) about 15,000 neat cattle were held on the Tejon—a number far below the capacity of the pasturage, as it is estimated that the pastures will readily carry 25,000 through any season. The property, lying as it does along the foot-hills of the Sierra, in Kern county and northern Los Angeles county, contains good winter pasture on the mesas (low tables flanking the mountains) and valleys and foot-hills and abundant grazing and water for the higher mountain country for the summer season.

A change from summer to winter grazing is always made on the Tejon ranch, and is partly due to the instincts of the cattle avoiding the storms and worn-out grasses of the higher country and partly to the fall "rodeo", when the stock, after being driven from the mountains, usually remains on the lower levels, although many work their way back into the foot-hills and pass the winter in sheltered valleys.

The summer pastures are entered about June, such cattle as are new to the country being driven into the hills, where the herds remain until the middle of October. The plan followed in herding is to reserve as far as possible the foot-hills, benches, or "mesas" for fall and winter grazing. Several streams flowing from the mountains and many springs furnish the stock with water; one extensive mesa several miles from the foot-hills is made available for cattle by a well 30 feet in depth, the services of a man and horse being necessary for several hours each day in winter to raise water for the use of some 1,500 cattle. When visited, the cattle of the Tejon were almost wholly on the north side of the mountains, and occupied the mesas of the Tejon ranch proper. The presence of cattle-thieves, coming in from the Mojave desert to the Liebra ranch, rendered the occupation of the property in Los Angeles county a possible source of loss, and occasioned the transfer in 1880 of all the stock to the Kern pastures. In the fall and winter six vaqueros and a mayordomo were required. These men were located at different

camps on the estate, and by constant riding kept a close watch on the cattle-range. On the north and west sides only was particular care in herding necessary, as in other directions no opportunity was offered for cattle to encroach upon farming lands, the mountains and the Mojave desert being natural barriers, preventing the drifting of stock from their pasture ground.

In March and again in October a "general rodeo" is conducted by the mayordomo and an outfit of twelve vaqueros, accompanied by a cook and camp-wagon. At these times neighboring stock-owners send representatives to secure and restore to their proper ranges such cattle as have strayed to the Tejon pastures. The whole crew, numbering perhaps thirty or forty men, work the entire stock range, marking and branding the young calves, and, in the spring rodeo, gathering beef for shipment to the San Francisco market. During the fall and winter, whenever the vaqueros in riding the country meet with calves following cows of the ranch brand they drive them to the nearest branding-pen, of which there are several on the estate, and there brand them. The general semi-annual rodeos and the driving of beef to the railroad for shipment require extra help, always available from the Indian reservation located on the Tejon. The herders hitherto employed have been Mexicans and Tejon Indians, but for several reasons white labor is preferred. On the different ranches of the estate there are several inclosures used for holding beef cattle while gathering such stock preparatory to shipment and also for grazing the saddle horses. One of 800 acres at the Tejon and another of 600 at the Castac are among the largest. Several small areas for growing wheat and barley hay are inclosed. It was the intention of the owner to stock the pasturage to its full capacity, though it was deemed advisable to effect this slowly, many of the upland grazing grounds having been injured, though not seriously, by the heavy sheep occupation of previous years.

The Tejon herd is not at present high grade, but is improving by the introduction of good grade shorthorn and Devon bulls. It is found that a comparatively light-bodied and active Devon bull is best for the rough upland ranges of the summer season, though the heavier and more sluggish shorthorn grade bull will answer for the mesa and the low lands. A remarkable illustration of the difference in natural increase of cows on different ranges is noticeable on the Tejon ranch proper and the Liebra ranch, the former having 1,500 feet less altitude than the latter. On the Tejon the annual branding of calves reaches 75 or 80 per cent., while on the Liebra 60 per cent. is the average rate obtained. This disparity is thought to be in part due to the habits of cattle in the largely broken and mountainous country of that range, while the more rigorous climate and later storms increase the mortality among young calves. About one bull to twenty cows gives the best result. The class of beeves turned off during the year 1880 averaged about 950 pounds live weight, and were marketed in the spring and summer in San Francisco, a few lots being disposed of to butchers in Kern county. A large number of calves were shipped during 1880. No general mortality among neat stock has occurred in this section, but an annual loss of from 5 to 7 per cent. has been experienced on the Castac ranch, chiefly from the effects of alkali and alkaline water. Loss from cattle-thieves on the Mojave side of the mountains has occasioned the withdrawal of cattle from the Liebra ranch in winter, while wild animals, late storms, and a disease called "big jaw" are all the sources of limited losses among the herds.

The commissary and general supply system followed at the Tejon is through the medium of a store, which deals in a large stock and is patronized by the Indians of the country. The vaqueros and some of the ranch hands are paid wages, beside which a monthly issue of rations is made, which they cook for themselves. The cost of boarding a hand is estimated at about $5 per month under these conditions. This vast ranch is the largest unfenced cattle range in California, and has a history of no little prominence.

SAN BERNARDINO COUNTY.—No large herds of neat cattle were in 1880 held in San Bernardino county, the ranging of this class of stock having been found impracticable under the existing no-fence laws. Stock ranches have been located for many years on the Mojave river, which rises in the San Bernardino mountains, pursues an easterly course for 100 miles through a desert country, and finally sinks in the desert. There at the present time are found the largest herds of cattle in the county, none, however, exceeding 1,300 head, while the entire number pastured in the Mojave country amounts to not over 5,000. The isolated situation of this pasture ground, its unfitness for sheep, the alkaline character of the soil preventing cultivation, combine to keep it an open cattle range, unaffected by the "trespass law". In the character of its grasses, and in the consequent quality of the beef raised the Mojave river is very much inferior to the coast and valley grazing of other parts of California. The rich feed of those grazing lands, the alfileria and burr clover, are found in very limited quantities in the Mojave country, and their place is illy supplied by coarser and harder grasses, such as salt and wire grasses on the river bottoms, and gietta grass, scattered bunch and sand grass, with browse feed of several varieties, on the outlying desert winter ranges. Cattle in the summer occupy only the narrow strip of bottom land lying on either side of the Mojave river, which varies in width from one-fourth to 1½ miles, but in the late fall and winter season, when the rain-water usually accumulates in hollows, or tanks, as they are called, at intervals throughout the Mojave desert the stock range out from 10 to 20 miles from the river into the country, at other times inaccessible from lack of water. Though the county of San Bernardino is liable, like all of southern California, to destructive droughts, no heavy losses of cattle in the section under description have been sustained of late years. The Mojave river sometimes exists only as pools, but still furnishes enough water for stock, while the pasturage has not been allowed by the few stockmen controlling the range to get overstocked. Cattle are here handled by crews of vaqueros, directed by a foreman or mayordomo, who mark and brand calves two or three times each year, and gather and drive the beef-cattle either for shipment to the north or more usually to the markets of San Bernardino or Los Angeles. As a

consequence of the dry and non-succulent character of the grasses, even in summer, beef-cattle rarely fatten well, but require to be held for a time on the superior pastures of Los Angeles county or San Bernardino valley.

The cattle of the Mojave country more closely represent the old Mexican breed than the cattle of any other range outside of San Diego county. It may be considered as not over one-half Mexican, although some herds are largely composed of American stock. So far as learned no thoroughbred or high-grade sires have been introduced, the animals used being merely average American (native) bulls. There, as on most level or mesa ranges, which encourage gregarious habits among cattle, the percentage of calves branded is claimed to be high, being at least 80 per cent. in a specified herd. It was stated, however, that the presence of alkali in the soil affects the fertility of cattle and brings on barrenness in cows at seven or eight years of age, and a loss of vigor in bulls after three or four years of service. Similar effects are reported for both Nevada and Utah. The isolation of the Mojave river, its complete environment by deserts, its uselessness as an agricultural section or as a scene of the growing sheep-husbandry, which has elsewhere largely taken possession of former cattle ranges, make it altogether a remarkable exception to the typical grazing sections of California; more especially from the fact that there alone the restrictions to open-range cattle-raising placed elsewhere on that industry by the trespass and no-fence laws have no force.

A SHORTHORN HERD.—In November, 1877, Mr. James Waters brought into Los Angeles by rail 18 head of thoroughbred shorthorns, purchased in Illinois. The stock were all *Herd-Book* animals of the white-rose, daisy, and multiflora families, and in November, 1880, had increased by careful breeding and management to 53 head, having been held on the farm of the owner in San Bernardino valley. The introduction of these fine cattle into the south of California was experimental, but it was hoped that a market for the increase would be found in Arizona and California among dairy farmers and stock-raisers wishing to improve their cattle. This hope has in part been realized, and many sales at remunerative prices have been made in the adjacent counties. At the time the farm was visited six head of bulls and heifers were shipped by the Southern Pacific railroad to Maricopa, Arizona, and thence driven to Prescott, for use in the herd of John Gosper, secretary of the territory of Arizona. The cows have bred uniformly and successfully, and, excepting three calves lost by injury to the mothers on the way from Illinois, the losses have only amounted to six head, all caused by bloat and indigestion, resulting from being turned out on alfalfa while the dew was yet on the grass. They were pastured in paddocks of alfalfa, and in the fall on stubble and corn land, and were not fed hay, excepting such as were used in the dairy. The calves were fed hay during three to four months, and the bulls, stabled in winter, were kept in good condition by hay and fodder, barley being sometimes given them. Each calf dropped was recorded in the American *Herd-Book*, and every effort was made to improve the quality of the young stock. The bull originally at the head of the herd had just been sold, and was succeeded by a young animal dropped in California but sired in Illinois. No thoroughbred bulls from the herd had ever been turned out among stock cattle, but a number of half-breeds sired by the bulls and out of good milch cows of neighboring ranches had been used on the range with satisfactory results. In the improvement of local cattle the importation of this finely-bred herd has had a marked and favorable effect.

DISEASES.

The diseases reported among cattle are "big head" or "big jaw", "bloat," "black leg," "abscess of the liver," and "Texas fever", the latter originating presumably in the country about Tulare lake. What the cattle men of the region call "abscess of the liver" is thought to be brought on by too much dry feed and the alkali of the region. One cattle-raiser claims to have lost 10,000 head of cattle in Kern county during 1879 from what he calls splenic fever, but which is simply Texas fever. A letter from Miller & Lux states that they had a fever in their herds which they believed to be Texas or splenic fever. Mr. Miller deems the best treatment to be removing the cattle affected from the low bottom-lands to a more elevated country; the very exercise of traveling up and down the hills and going to water seems to have a beneficial effect, whereas if they stand moping together their systems become clogged. Whatever the disease, Mr. Miller regards it as contagious, but not infectious, or not conveyed by the atmosphere. He thinks it is communicated to healthy cattle by contact with the sick ones, or with their effluvia, their dung, their urine, and their saliva left upon the grass in grazing, but a good fence is sufficient for stopping the spread of the disease to cattle in adjacent fields; he considers the disease more fatal among higher-grade cattle: the better and the finer the breed the greater the percentage of loss.

ESTIMATED NUMBER AND VALUE OF CATTLE IN CALIFORNIA BY BREEDS.

Breeds.	Cattle.	Assessed value per head.
Total	815,044	$12 49
Thoroughbred	1,000	56 82
American	250,000	17 95
Seven-eighths blood American	425,000	10 39
One-half to three-fourths blood American	110,000	9 49
California	29,044	8 00

In the above are included 200,000 milch cows and 7,000 work oxen.

ESTIMATED AVERAGE VALUE OF VARIOUS CATTLE IN 1880.

Class of stock.	Unimproved.	Improved.
Bulls	$25 00	$40 00
Cows	15 00	20 00
Three-year-old steers	18 00	22 00
Two-year-old steers	15 00	18 00
Yearlings	10 00	12 00
Calves	7 00	10 00
Beeves	22 00	25 00

ESTIMATED AVERAGE WEIGHT OF GRASS-FED THREE-AND-ONE-HALF-YEAR-OLD BEEF ON STOCK RANGES IN 1880.

[Compiled from statements of cattle-raisers throughout California.]

Name of section.	Breeds of cattle.	Net weight.	Live weight.	Value.
		Pounds.	*Pounds.*	
Northern California	American	575	1,100	$24 00
Central California	Graded American	600	1,150	25 00
Central California	Seven-eighths American	525	1,000	23 00
Central California	Three-fourths American	475	925	$21 00–22 00
Southern California	American	550	1,050	24 00
Southern California	Three-fourths American	500	950	22 50
Southern California	Half-breed California	450	875	21 00
Southern California	California	425	800	19 00

ESTIMATED WEIGHT OF GRASS-FED CATTLE IN 1855 AND IN 1880 ON CALIFORNIA PASTURES.

Age.	Net weight, 1855.	Net weight, 1880.
	Pounds.	*Pounds.*
Yearlings	250 to 400	400 to 450
Two-year-olds	350 to 400	550 to 600
Three-year-olds	400 to 450	600 to 650
Beeves	450 to 500	750 to 800

The above estimate was given by Mr. Henry Miller, of the firm of Miller & Lux. Those designated in 1855 were Mexican stock, while those referred to in 1880 were American stock variously graded by the introduction of shorthorn bulls. The weights given for 1880 are probably in advance of the average stock of the state.

The composition of certain herds of California cattle, aggregating, in 1880, 258,677 head, was as follows:

Class of stock.	Number.	Per cent.
Bulls	3,724	1.44
Cows	82,571	31.92
Beeves	28,454	11.00
Two-year-olds	38,801	15.00
Yearlings	44,850	17.34
Calves	60,277	23.30

The estimated number of calves dropped to each 100 cows was 80; calves branded, 76; calves surviving to yearlings, 73. The percentage of annual loss among cattle over twelve months old was 4.9 per cent.

SHEEP.

Before 1852 the sheep of California were the coarse-wooled Mexican. There were large drives from New Mexico for mutton and for stock for a number of years after that date. (*a*)

a Drives into California began about 1852 for mutton and for stock. Colonel Chavis, of New Mexico, was one of the chief movers in the beginning; also the Luna family. Through the courteous interest of these gentlemen in the matter referred to the following close estimates have been prepared:

1852, sheep driven from New Mexico into California, 40,000; some sold as high as $16 per head.

1853, sheep driven from New Mexico into California, 135,000; sold from $9 to $12 per head.

1854, Colonel Chavis himself drove (the total drives that year) 27,000.

1855, total sheep drive, 19,000.

1856, total sheep drive, 200,000.

1857, total sheep drive, 130,000.

Sheep brought about $3 37 per head in these years.

1858–'59, Indians troublesome; small number driven.

1860, business ceased.

Total number of sheep driven from New Mexico into California from 1852 to 1860, inclusive, 551,000.

From Colonel Stoneroad and Colonel Chavis, both of New Mexico, we have the following records of sheep driven from California to New Mexico in more recent years.

1876, Colonel Stoneroad took from Merced county, California, to Puerta de Luna, New Mexico, 10,000. His route was up San Joaquin valley to Bakersfield, and along the railroad to Tehichipi pass, in the Sierra Nevada; thence to Cottonwood, on the Mojave river, where the

The first to come in from the eastern states were from Illinois and Missouri, in 1852. Colonel W. W. Hollister and Hubbard Hollister, Thomas and Benjamin Flint, Jothan Bixby, W. W. Cole, and James Moore were the pioneers of that immigration. They were followed before 1858 by H. A. Rawson, Peters, Murray brothers, G. W. Grayson, and others. The various flocks of "chaurros" have been crossed with the best blood of the east until the original small, coarse, bare-bellied, and hairy Mexican stock has disappeared, though its hardiness and herding habits and motherly instincts have remained to some extent with the improved descendants. After the long and perilous drive that those pioneers conducted, there survived generally from 30 to 40 per cent. of the stock, but what remained of the flocks were worth five times their cost. Succeeding the graded sheep of Illinois, Missouri, and Ohio there came in the Spanish merino rams, until 75 per cent. of the sheep in California are high-grade merino.

Since sheep husbandry attained prominence in California the growth of the business has been irregular. The great storms of the winter of 1861–'62 followed by the drought of 1863–'64, worked havoc in the flocks. Southern California was almost stripped of sheep, which were not fully replaced for ten years. In 1871 the same section of the state was again visited by a drought, and 20 per cent. of the stock was lost before the flocks could be moved. Threatenings of drought in 1873 caused the driving of flocks from the same section of the state 275 miles to the mountains of lower California. In the north the winter of 1874–'75 was disastrous. The rains coming on in November, before the grass started a winter of unusual severity followed. In the winter of 1876–'77 there were only five inches of rain in portions of Los Angeles county, and stock had to be driven 125 miles to the mountains of San Diego county. The losses of 1877 were estimated in southern California at 2,500,000 head of sheep, for the pastures were overstocked before the drought. Sheep were sold at sheriff's sale for from 25 to 30 cents. Stock fled in every direction, to Arizona, to New Mexico, and to the Sierra Nevada. The winter of 1879–'80 was severe in the north. Early rains started the grass, but dry and very cold weather followed in December and January. The winter of 1880–'81 has proved most favorable for sheep, and except in some parts of northwest California there were no losses from unusual severity of weather. Imports have ceased entirely since 1877, except rams for experimental breeding. The general "breeding-up" is to merinos, but a few cotswolds and southdowns have been introduced in central and northern California. From drives of 50,000 in 1877 and about the same number in 1878 exports increased to about 100,000 in 1879, and in 1880 were close on 150,000. Drives go out to Montana from the northern part of the state, generally above Lassen-Butte through south Oregon to Snake river; from middle California they go from Independence, thence up Owens river, and through Esmeralda county, Nevada, across Ralston desert to Humboldt Wells, from which, by Goose, Raft, and Snake rivers, they reach the divide of the Rocky mountains between Idaho and Montana. From southern California to Arizona and New Mexico they go by the way of Mojave river and fort Mojave.

The principal sheep counties of northern California are Mendocino, Tehama, Humboldt, Sonoma, and Colusa, named in order of importance, Mendocino holding over 375,000, and none of them holding less than 200,000. In central California, Fresno, Kern, Merced, Tulare, Stanislaus, and Sacramento have over 200,000 each, Fresno leading with about 750,000. In southern California, Los Angeles county leads with over 550,000.

Sheep are remarkably free from disease in California, but the year 1879 was particularly unfavorable to all stock by reason of drought.

As sheep husbandry leads in that state, we might expect the opinions of California stockmen to favor the effect of sheep upon the pasture. As in Texas, this turns principally upon the character of the soil. The testimony of the principal sheep authorities in the state is unanimous that unless a range is heavily overstocked sheep, as a whole, benefit the grazing; they certainly thicken the grasses whether they improve the quality or not. Where sheep are under fence, or where by judicious herding the grounds have rest at the right time, they improve the grazing. One valued authority in Humboldt county says:

> When, after three to five years' sheep holding in moderate number, our original grass appears to run out, a new and denser grass starts, making pasture that will carry 40 per cent. more sheep in the fifth year than it did in the first, and weeds are destroyed, as would not have been the case had cattle or horses eaten off the first crop.

The general testimony of the cattle men coincides with that of the sheep men, except three. The first is Mr. John Forster, of San Diego county, who says:

> Sheep permanently injure ranges for feeding purposes, but not for agricultural; they destroy the natural grasses, which are succeeded by those of a coarser (or stronger) nature, not so luxuriant and less succulent.

The superintendent and the assistant superintendent of General E. J. Beale's Tejon, Castac, Alamos, and Liebra ranches, in Kern county, said that sheep seriously injure pasturage, but not beyond recuperation; but Messrs.

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desert begins; thence down stream to a point much below sea-level. Here comes the real desert trail from the "sinks" to Union pass through the Blue Ridge mountains of Arizona, about 150 miles, with very little water. The further route across Arizona will be found on its proper map. The whole distance, about 1,600 miles, consumed seven months and a half.

1876, others, Pinkerton, Carpenter, and Cosner brothers (robbed and murdered), drove 16,500.

1877, by same route, Stoneroad, Hugo Zuber, Captain Clancy, McKeller, Robinson, and Curtis took 12,500; other flocks, say 5,000.

1878, Booth and Clancy took 4,000.

All the above were grade merinos, such being very scarce in New Mexico. They cost $2 per head in California, and were worth in New Mexico $3 50.

Miller and Lux, after twenty-five years' experience in pasturing cattle in San Mateo, Santa Clara, San Benito, Monterey, Merced, and Fresno counties, as well as in Kern county, testify to the effects of sheep to this effect:

> Ranges are benefited by sheep if the stock is judiciously grazed; then they are sure to increase the yield and improve the quality. They must not be kept on too long in winter, so as to cut up the low land and tread out the roots, nor too heavily in spring, so as to prevent the grass from bearing seed. California land needs the packing that sheep give, and their tramping, when not excessive, prepares the soil to retain the surface rains to nourish better and more varied grasses. We have most carefully noted results, and know that land used for sheep with judgment is always improved in California.

Except in the southern part of California, stock-raising is usually associated with agriculture, and not many persons keep sheep or cattle exclusively. In Tehama county, from which about 25,000 sheep were driven in 1879, and which held about 275,000 at the close of the year, a representative wheat and sheep grower who was visited raised 15,000 acres of wheat and had 16,000 sheep. In winter the sheep run on a free range of a rough lava formation, situated on the hills with a valley on the west and with mountains on the east. His sheep are incident to the grain-farm, and utilize stubble and waste food. After feeding down and gleaning the stubble in the autumn, and cleaning off weeds, they are run back on the lava hills, where, ranging a wide scope of country, they get a living until spring and summer, when they are driven to the mountains to remain until after the grain harvest. In winter they run loose, and in spring flocks are made up of about 8,000 each for the mountain drive. Arriving on the summer range, they are kept in flocks of 2,500 or 3,000, wethers and young sheep together, ewes and lambs together. Twenty years ago Tehama county was all open, uncultivated land, free to flocks and herds; but agriculture has narrowed the range and changed the nature of the business. Now there is but little sheep husbandry independent of farming, and the investment must be large to permit the expense of driving flocks to and from the mountains. The change of tenure has been from mere occupation of government lands to actual title. Holding land in large bodies for agriculture is giving way to the demands for smaller tracts. As soon as a man can make a living out of one-quarter section of government land it is taken up, and thus the large free ranges held by possessory title yield to the higher and stronger title in fee and to the demand for agricultural land. This is mentioned here to illustrate what is elsewhere said of the land movement throughout the state, more visible in a county like Tehama than in Kern or San Diego counties. The lava lands for winter occupation are on the west slope of the Sierra and probably support a sheep on about four acres. For the summer, on the higher mountain ranges, one acre will graze a sheep. Other grades of pasturage west of the Sacramento river will do the same. The number of cattle does not reach 13,000 in Tehama county, where formerly they were very numerous. The account current of the gentleman who furnished these facts concerning Tehama county, with ample capital to hold a large farm, showed a net profit for three years of 27 per cent. upon sheep, while his wheat averaged 40 bushels per acre. Being asked what his wheat yield was twelve or fifteen years ago on virgin soil he answered, "Forty bushels." To the inquiry, "And how is it that the yield has not decreased where you never manure?" he replied, "My sheep furnish yearly manure to the stubble fields that fatten them before they are turned out for winter." The practice of change of pasture from summer to winter is to be particularly noted in California. Pastures have time to recuperate; the animals benefit by variety of feed and climate. Generally, too, the changes are within comparatively short travel. Without the Sierra Nevada the raising of sheep would be greatly modified in the state. That great range is the place of refuge in times of drought and in ordinary summers when all the pasturage of the plains is dry. The mountain ranges between Kern and Los Angeles counties have long been the resort in seasons of drought for stock from Los Angeles, Ventura, and Santa Barbara counties. In the memorable drought of 1863–'64 the country from Kern lake to the Mojave desert and from Tehichipi southwest to fort Tejon was occupied by 100,000 head of horned cattle and immense numbers of sheep. These animals were driven in from the drought-stricken regions, and turned loose to save them. There are not now over 65,000 cattle in all the rest of the mountains. In from ten to fifteen years the numbers in southern California have dwindled away because of the settlement of the public lands in most of the valleys under the pre-emption laws, and because the "trespass law" forces owners of stock to the expense of restraining them by fence or by other means.

CONDUCT OF SHEEP-HUSBANDRY.

It seems best to illustrate sheep-husbandry in California by a few representative cases, selecting four from northern California, A in Humboldt county, B and C in Mendocino county, and D in Tehama county; two from central California, E in Monterey, F in Kern county, and four from southern California, G, H, I, and K, all in Los Angeles county.

NORTHERN CALIFORNIA.—Flock A, in Humboldt county, contained 120 rams, 8,000 ewes, 8,280 wethers, 1,600 lambs; total, 18,000.

22,000 acres of land owned, at $5	$110,000
Land leased	5,000
Equipment in vehicles, harness, tools, etc	1,000

Horses, worth	$500
Shepherd dogs	350
Investment in plant	116,850
Investment in flocks	36,000
Total investment	152,850
4 men employed by the year, at $30 per month, board included	1,440
10 men employed shearing for 15 days, at $1 50 per day, board included	225
Total expense for labor	1,665

Sheep run at large, not divided as a general thing, except that the ewes are separated from the wethers during lambing season. Sheep are taken to the summer range in June and return before fall shearing in September. Where ranges cover both summer and winter ground the sheep hold the high places when the snow is off; they are corralled for marking lambs in the spring; also for shearing; never shedded. Sheep not fed as a rule; but when snow lies from six to eight days, too deep to permit them to reach grass, scatter barley on the snow, half a pound for each head per day. No land kept fenced for hay for sheep. Rams are allowed to run with ewes from September to November. Ewes lamb in February, March, and April. Sheep are sheared in June and September. Lambs are castrated four weeks after birth. Goats are not allowed to run with sheep. Fifteen hundred acres of average grazing-land are required to keep 1,000 head of sheep, using low bottom for winter pasture and southern hillsides for summer pasture; object, wool. We breed common sheep to Spanish merino rams as high as three-quarters and no higher; average price of wool in 1875, 23 cents per pound; average, 5 pounds per head; average price per wool sold, 30 cents per pound; average present shear, 6 pounds of light and long staple; wethers not sold for mutton are kept for wool. They are preferable to use for wool up to five years of age; old sheep are picked for mutton. One ram is apportioned to 100 ewes, renewed every three years; sheep are subject to scab, the only disease known in this county. The average per cent. of losses is 15, wholly from storms.

Flock B, Mendocino county, contained 35 rams, 1,500 ewes, 500 wethers, 760 lambs; a total of 2,795.

4,600 acres of land owned		$13,000
Buildings and fences		2,500
Equipment in vehicles, harness, tools, etc		300
6 work horses, at $60 each; 3 riding ponies, at $15 each		405
2 dogs		75
Investment in plant		16,280
Investment in flock, at $2 per head		5,590
Total investment		21,870
1 man employed by the year, at $20 per month, board included		240
Occasional help for field-work	$240	
Shearers, including board	300	
		540
Total expense for labor		780

I am my own shepherd; formerly kept two, but now, with the sheep mostly under fence, labor is lessened. When out on range the sheep know the ground, having been raised here, and there are very few wild animals to destroy them. Shearers are generally Indians, who are slower but more patient and do better work than white men, and are easier to manage, too. An Indian averages 35 fleeces per day; white men 55 fleeces. I pay 5 cents per head and furnish board. Flocks divided into four bands. The rams are corralled by themselves. The wethers are kept together on one range, because, being more restless and traveling farther than the ewes, the weak sheep would be run too much if they were with the wethers. The other bands are mixed and grazed on separate ranges. Scarcely any chance for summer and winter grazing, except to rest a range for a month before lambing, so that the ewes may have fresh pasture in lambing season. Sheep are corralled for marketing and shearing; also for dipping and doctoring. Rams are shedded in severe weather when feed is short. Rams are fed before and after service season a quart of oats a day beside pasture; and hay and oats for two months in winter. I did not feed till two years ago. I have 120 acres under fence; cut hay from 35 acres; rams run with the ewes September 1 to October 15. Lambing season, last week of January to latter end of March. Spring shearing begins the last week in May; lamb shearing about July 15 (this lamb shearing we adopted last year for the first time and shall continue it; shearing at that time frees them from grass seed). Fall shearing begins the last week of September. Lambs are castrated six to eight weeks after birth. Goats were formerly used as leaders for flocks, but they proved troublesome; 2,500 acres of average grazing land are required to keep 1,000 head. Wool is my object. Cross the common flocks with fine grade or pure-blooded Spanish merino rams, and weeding out, as we go, the old and coarse sheep; thus, from a flock that sheared but 5 pounds of coarse wool per annum, we have brought up the produce to 8 pounds per sheep of fine wool. Our aim is to reach sheep of even, compact form, shearing 10 pounds of long, fine wool. For these purposes we select for preservation to breed both ewes and rams according to our ideal. Wool brought an average price of 24 cents in 1875; average shear, 6 pounds per head; last wool sold brought 29¼ cents for spring wool, 19 cents for fall wool; present average shear, 8 pounds per head, not classified until sold. Wethers are kept for wool; on some ranges it is more profitable to keep wethers than mixed flocks. One ram to 100 ewes at home, two in the mountains; for average quality I change rams every three years. In-breeding is good with fine flocks only. Our diseases are fluke, scab, water on the brain, and foot-rot; the first is the most fatal. Our losses are estimated to average 2 per cent. from disease, 5 per cent. from storms, 1 per cent. from dogs and wild animals, 2 per cent. from other causes; a total of 10 per cent.

Flock C, Mendocino county, contained 200 rams, 5,000 ewes, 4,000 wethers, 2,200 lambs; a total of 11,400.

16,000 acres of land owned, at $5		$80,000
Buildings and fences		3,200
Equipment in vehicles, harness, tools, etc		1,000
40 horses, worth		2,000
9 dogs, worth		500
Investment in plant		86,700
Investment in flocks		26,400
Total investment		113,100
5 men employed throughout the year, 2 at $30 per month, 2 at $25, and 1 Chinaman, at $18, board included with all		$1,536 00
At shearing time, 20 extra men for 12 days, at 6 cents per fleece (11,400 at last shearing)	$684 00	
Board, at 37 cents per day	88 80	
		772 80
Total expenses for labor		2,308 80

Ewes are kept separate from wethers during lambing, because the latter travel too much for the ewes and lambs; also keep separate the sheep preparing for mutton. No changes of pasture made in the northern part of the state except as sheep themselves choose, occupying the highest ranges during summer. In the large valleys of Sacramento and San Joaquin, and thence southward, sheep are driven to the mountain ranges in summer. Our tule lands furnish good pasturage during summer. Sheep are corralled for marking and shearing; also for dipping and doctoring. Rams are shedded for severe weather when feed is short. We feed alfalfa hay to rams only. We keep land under fence to cut hay. Rams run with ewes in September; February is the lambing season, and shearing is done in May and September. Lambs are castrated four weeks after birth, but the sooner the better. Goats are not run with sheep. Flocks in this section number from 1,000 to 3,000 head. The ranches are not generally fenced, and the sheep not herded; but the man whose business it is to look after the flock and one regular assistant can easily care for 3,000, keeping on the outskirts of the range to see that the sheep do not leave the range and that they are not harmed by enemies. Two thousand five hundred acres are required to keep 1,000 head. Both wool and mutton are the object, wool mainly. The standard is half-breed; this is graded up to Spanish merinos. We seek a sheep to weigh 120 pounds and net 60 pounds off the range for mutton. This sheep should give 8 pounds of wool per annum. For this purpose we select sheep short in the legs and of compact form, avoiding wrinkles so far as possible, one fold only in the neck being preferred. We do not like wool of dark color. As the ranges are mountainous, strong sheep are required. Wool brought an average in 1875 of 20 cents at home, average shear 5¼ pounds a head; average price of last wool sold, 27 cents. The present average shear is 7 pounds of medium long staple, and it brought the highest price in the state. There has been no surplus of wethers in Mendocino county except one year, when the old wethers were slaughtered for hides and tallow. Two rams are apportioned to 100 ewes, renewed every three years. Scab is the only disease. Mendocino county has no stated diseases that kill sheep. We estimate our loss from storms as 3 per cent.; from dogs and wild animals, 3 per cent.; from theft, 1 per cent.; from other causes, 3 per cent., or 10 per cent. in all.

Flock D, Tehama county, contained 200 rams, 6,000 ewes, 7,000 wethers, 2,000 lambs, or a total of 15,500.

15,000 acres of land leased, at 25 cents per acre		$3,750
Equipment in vehicles, harness, tools, etc		300
4 horses, worth		400
6 dogs, worth		100
Investment in plant		4,550
Investment in flocks		31,000
Grand total investment		35,550
6 men employed throughout the year, at $100 per month; 5 at $25 per month, board included		2,700 00
At shearing time, 5 extra men for 15 days, at $1 per day (to serve at corrals, handle and prepare all for shearers)	$75 00	
Shearers, at 5 cents per fleece (13,000 fleeces at last shearing)	650 00	
		725 00
Total expenses for labor		3,425 00

Average shear, one man, 60 per day in spring, 50 per day in fall. Sheep are not banded in winter, but run at large. In spring, when driven to the mountains, they are broken into bands of about 3,000 each; yearlings and over go together, ewes and lambs together. Rams run with the ewes September 1, to continue six weeks. Lambs are born February and March; shearing is done April and September. Lambs are castrated from a month to six weeks after birth. Goats are not run with sheep. Twenty years ago all this section was an open, uncultivated range; plenty of feed everywhere, and there were usually 100 lambs raised to the 100 ewes. With the change to agricultural occupation, sheep-husbandry became crowded and less profitable. It is now a branch of farming, and rarely run alone; the exceptions are on lands bordering and between valleys and mountains, where agriculture cannot be pursued. My own sheep run generally on free range. My system is simply this: Bands are herded by day and corralled at night. Wages make the principal expense—$25 to $30 per month, board included. Sheep are "doctored" at shearing time by rubbing them with, or dipping them in, a preparation to prevent or cure scab. In lambing time they suffer from coyotes. In the mountains bears and wildcats cause loss. Winter storms also do harm. Ordinarily, however, the business runs on from season to season favorably and with profit. We expect the increase to pay all expenses and leave the wool for profit. It is impossible to feed large flocks to advantage, and it would injure their habit of "rustling" for sustenance; I do not feed, and I keep no land under fence. On the west slopes of the Sierra, on what are called "lava" lands, from three to five acres will probably winter a sheep; on our good grazing-lands one to two acres will sustain one head. The summer mountain ranges will do the same. My object is wool; there is small market for mutton in Tehama county. I can't give the price in 1875, but the shear was about 6 pounds; the last wool sold averaged 27 cents a pound; the average shear now is 7 pounds per

annum of light medium wool with a good reputation in eastern markets. I breed common ewes to Spanish merino rams. I believe in retaining hardy qualities, even at expense of the wool product, and I get a sheep that can take care of itself. A fine-bred sheep will not answer the Tehama purposes. Wethers should net 60 pounds, ewes 50 pounds. They should yield 7 pounds of wool in the two shearings, the spring clip being the better. I seek to produce wool of medium fiber as to fineness and of medium length, and not heavy, greasy wool, and I avoid greasy sheep. I want round, smooth, heavy, close-built carcass on short legs. Merino bucks on common sheep make the medium fine light wool. Wethers are generally driven east of the mountains by traders, who probably sell them for mutton. Wethers are profitable shearers for several years. Feed in valleys dries up about June 1, and then flocks are driven to the mountains. In September, when cold and storms come in the mountains, the sheep are driven back to the valleys to remain until spring. We shear when they come down, and again in spring before they are moved to the mountains. The rainy season generally begins early in November. Late rains subject sheep to loss from their being forced to subsist on dry or scarce feed until rains come. Sheep are corralled at shearing and in the mountains at night to protect them from wild animals. Never shedded, because it is impracticable with such large numbers. From two to three rams are apportioned to 100 ewes, and should be changed every three years. Scab is the only disease, and that not fatal.

CENTRAL CALIFORNIA.—Flock E, in Monterey county, contains 30 rams, 2,800 ewes, 1,000 wethers, 1,600 lambs; total, 5,430.

14,000 acres of land (only 5,000 specially for sheep), at $2	$10,000
Buildings and fences	4,000
Equipment in vehicles, harness, tools, etc	1,000
20 horses, worth	1,000
Investment in plant	16,000
Investment in flocks	10,860
Total investment	26,860
3 men employed throughout the year at $35 per month	1,260
At lambing, 4 extra men for five weeks, at $45 per month, board included	225
Total expenses for labor	1,485

In lambing bands ewes and lambs run together until weaning, say when lambs are five months old. The lambs are then herded by themselves or cross-weaned, *i. e.*, the lambs from one flock are put with the mothers of the other. After six weeks, flocks are sorted into bands of 1,600 or 1,800, ewes and lambs. When the rams are placed with the ewes all the old and inferior ewes are culled out, and joined with wethers to form the mutton band. Flocks are changed to various camps in both winter and summer, according to state of pasture. After harvest they are grazed on stubble. Lambing flocks are always corralled. Others we merely "camp out", unless wild animals oblige corralling. We never shed nor feed sheep. Rams run with ewes from September 1 to October 15. Lambing seasons are from February 15 to middle of April, and from October 15 to November 15. Shearing in March and September. Lambs are castrated about six weeks after birth. Goats are not run with sheep. Three thousand acres of average grazing are required to keep 1,000 head of sheep. Our object is wool chiefly, with a fair carcass. I breed to pure Spanish merino rams, and aim to produce a fleece of medium quality, fine enough without being gummy, and to handle softly. In this I have succeeded so that my wool has a known name in the market. I prefer the Spanish merino as being the best bred to withstand the hardships of weather and hunger. The heavier cotswold and Leicester will not stand the summer heat of our valleys, and they will not herd as merinos. I do not know price in 1875, but the shear averaged about 6 pounds. Last wool sold averaged 22½ cents. The last shear averaged 6 to 7 pounds of good staple, fine quality, slightly seedy and dusty. All wethers are consumed in the state. One ram is apportioned to 100 ewes. Renewed every three years. In-breeding is a mistake unless wisely directed. Sheep are subject to scab, sometimes to worms in the head; the latter is the only fatal disease. Estimated loss from all causes, 6 per cent.

Flock F, in Kern county, contains 700 rams, 38,000 ewes, 15,000 wethers, 12,000 lambs; a total of 65,700.

180,000 acres owned, 60,000 for sheep, at $2		$120,000
20,000 acres leased, at 12½ cents per acre		2,500
Buildings and fences		12,000
Equipment in vehicles, harness, tools, etc		2,000
Horses		3,000
Investment in plant		139,500
Investment in stock		131,000
Total investment		270,500
70 men throughout the year, at $35 per month, board included		29,400
At lambing, 10 extra men for 6 weeks, at $35, board included	$525	
At shearing, 10 extra men, exclusive of shearers, at $1 50 per day, board included; last shear was 65,000 fleeces, at 5 cents per fleece and 35 cents per day board	3,663	4,188
Total expenses for labor		33,588

Always run sheep in separate flocks, none numbering more than 2,500 head, and none less than 1,500. The different sexes are generally divided before twelve months of age, and are thereafter kept separate. Summer and winter changes are determined by the coming of cold and rain. Never corral unless stormy weather, sandstorms, etc., compel it. We never shed, nor do we feed, except to thoroughbred sheep sometimes in winter. Our surplus horse-hay suffices for the thoroughbred sheep. No land kept under fence to cut hay. Last part of August and through September, and in May for fall-lambing ewes. Lambing seasons are from February 15 to the middle of April, and from October 15 to November 15. Shear in March and September. Rams run with ewes from September 1 to October 15. Lambing generally continues six weeks from February 1. Shearing-time is from about April 15 to May 15, and again from September

1 to October 1. Lambs are castrated six weeks after birth. Goats are not run with the sheep. Four thousand acres of average grazing-land are required to keep 1,000 head of sheep. Our object is principally wool. I breed common ewes to Spanish merino rams, seeking and producing ewes of good frame to dress about 50 pounds and shear 9 pounds of wool; wethers of compact carcass to dress 60 to 65 pounds and shear 10 pounds of wool. In 1875 we got 16 cents for spring clip, and 12 cents for fall clip; have no memorandum of shear then. Last sale of wool was for 18 cents. Last shear averaged 7 pounds of wool per annum, classed in the eastern market as southern California wool. We aim to sell all wethers for mutton. One ram is apportioned to 60 ewes. I believe in in-breeding. Sheep are subject to scab and foot-rot; no severe disease. The average percentage of losses from all causes is estimated at 3 per cent.

SOUTHERN CALIFORNIA.—Flock G contained, July 1, 1880, 300 rams, 12,000 ewes, 3,000 wethers, 5,000 lambs; total, 20,300.

60,000 acres owned, at $5		$300,000 00
Buildings and fences		3,000 00
Equipment in harness, vehicles, tools, etc		2,000 00
Horses		1,000 00
Investment in plant		306,000 00
Investment in stock		40,600 00
Total investment		346,600 00
25 men, at $25 each per month, board included		7,500 00
Lambing time, 12 extra men for 6 weeks, at $25 per month, rations or board included		450 00
Two shearings, or 40,500 fleeces, at 5 cents	$2,025	
Board, at 20 cents per day	500	
		2,525 00
Total expense for labor		10,475 00

Sheep permanently divided into bands of 3,000, ewes of two years in one band, ewes of three years in another, and so on; wethers in the same way; yearlings also in bands. In summer sheep are kept near the rivers and stubble fields; in winter and spring they pasture in the hills, where grass is green. Some years in drought sheep must be driven to distant mountains to find feed and return to the valleys in fall and winter. Every herder has a corral, but the sheep are never put in unless wild animals are around, or the shepherd, being sick, cannot attend to them, or at lambing time. Sheep are never fed. Rams run with ewes August 1 to September 15; season for lambing January and February; shearing commences April and September. Lambs are castrated twenty days after birth. The custom of running goats with sheep has been abandoned. In the section of country located on the coast and extending, say, 25 miles southwest and northeast of the village of San Juan Capistrano, 50 miles in length, with an average width of about 15 miles, a rolling hill land, generally crossed by several small, fertile, well-watered valleys, that open on the Pacific, two or three of which valleys are extensively cultivated by small farmers; in this designated region there are six land-owners, holding 60,000 sheep (December, 1880), and eight land lessees with 58,000 sheep. With but one or two exceptions these sheep-husbandmen are prospering, especially the Basques, several of whom have made money enough to retire on, and this has been done within six years. This is mentioned, as in the rest of the circular the conduct of the business is described in detail. Of the land owned here most is under large Spanish grants, parts of which are leased to sheep-raisers. A good season produces luxuriant crops of alfilaria, burr clover, and wild oats, the second being our main reliance during the dry months. The water supply is sufficient for stock, and nearly all the valleys have small streams. Where small farmers are, the water is utilized for irrigation. Our public domain is unsuitable for sheep or for cultivation—only rough hills and barren mountains. The changes that have come about are that up to 1867-'68 this section was full of native cattle and horses. Now these have almost disappeared, and settlers, shepherds, or farmers have come in, acquiring lands under the pre-emption laws, or leasing them. The changes were brought about: 1st, because the native cattle of the section could not compete with the better grade raised elsewhere, north and northeast; 2d, the trespass laws made owners liable for damage done by stock. One thousand to fifteen hundred acres of average grazing land are required to keep 1,000 sheep. My object is wool, although our sheep are good mutton. The flock I run was originally composed of well-bred French merino ewes. We crossed them with Spanish merinos, which improved the wool and gave a more compactly-built animal. This has been pursued for six years with satisfactory results in the number of lambs, size of carcass, weight and length of wool, and a minimum amount of feed per head. One shearing per year gives an average clip of from 7 to 8 pounds of good length, straight, and of fine quality. Our wethers of three and four years dress 60 pounds, or are, gross, 120 pounds. They endure hardship well, and eat less than any other class of sheep I know. The French merino is of large size, but coarse in bone and wool, and not very hardy. The grafting of Spanish merino produces square carcass as heavy as the French, but not so tall. It diminishes the weight but improves the quality of the wool, and the offspring is hardier. My wool brought an average of 20 cents a pound in 1875, averaging 7 pounds clip. Last wool sold for 21½ cents. Last fall sheared 4 pounds as the average, and this spring we averaged 6 pounds; we class it fine merino. There are not many old wethers, for we begin to sell them at two years and sell at small price with every opportunity. With proper care they can be kept until seven or eight years of age, though in their prime at four. One ram is apportioned to 100 ewes and changed every three years. No disease but scab, controlled by good care. I estimate the average percentage of losses from all causes: From disease, 1 per cent.; storms, 1 per cent.; dogs and wild animals, 1 per cent.; poisonous weeds, 1 per cent.; other causes, 1 per cent.; total loss, 5 per cent.

Flock H contained 300 rams, 7,500 ewes, 3,000 wethers, 7,000 lambs; total, 17,800.

No investment is given. Herders get $20 to $25 per month and board; others $25 per month and board. In lambing time, one extra man for each lambing flock, for seven weeks, at $20 per month, board included. Shearing paid at 6 cents per fleece, and the average is 40 fleeces per day to the man. Sheep generally subdivided when lambs are weaned, say July or August, and then continue through the year without much change; 1,500 to 2,000 can herd together on rough, hilly ranges, and from 2,000 to the extreme of 4,000 on level ground, with abundance of water and feed. In summer sheep are kept near the rivers and stubble fields; in winter and spring they pasture in the hills where grass is green. Some years in drought sheep must be driven to distant mountains to find feed, and return to the valleys in fall and winter. Sometimes corralled at night as defense against wild animals. Sheds are seldom used, except for fancy animals. Never feed sheep. Rams run with ewes September and first half of October. Seasons for lambing, February and March. Spring shearing, March and April; fall shearing, August and September. Lambs are castrated ten to fifteen days after birth. Goats do not run with sheep. Three thousand acres of average pasture are required to keep 1,000 sheep. Our object is both wool and mutton. Over an average of one year's wool pays the expenses; the increase is profit. If the object is principally wool, as mine is, I do not believe

in cross-breeding, *i. e.*, a long, coarse wool with merino—as for example, cotswold or southdown with the merino. The first cross makes a pretty fleece, but after that the wool becomes irregular, breeding back either to the coarse side or to the fine; the clip is neither one nor the other. Cross-breeding is profitable only in breeding for mutton. My aim is a merino with fine, long staple, without too much grease, and having few or no wrinkles; a full, round body, and straight, short leg. Ewes should weigh 100 pounds, bucks 150 pounds. Here we have what is adapted to the country and most profitable. We can do this only by breeding up to the "Spanish merino family". Cannot give price or clip for 1875. We shear 5 pounds in spring and 3 in the fall, receiving 24 cents for spring, 14 cents for fall clip. We class it "southern, slightly burry". Wethers not sold for mutton die. One ram to 75 ewes will do on good range. Renew every third year. The whole state is, as a rule, free from disease. Scab is the exception, and that is not fatal. Estimated loss from all causes, 3 per cent.

Flock I contained 50 rams, 4,700 ewes, 6,300 wethers, 3,500 lambs; total, 14,550.

45,000 acres leased, at 10 cents per acre	$4,500 00
Fences and corrals	300 00
4 horses	200 00
Investment in plant	5,000 00
Investment in stock	29,100 00
Total investment	34,100 00
9 men employed throughout the year, at $40 each per month, board included	4,320 00
Taxes on sheep	300 00
Lambing time, 16 extra men, at $40 per month, board included, for six weeks	960 00
Shearing 29,000 sheep for the year, at 7 cents per fleece (this is by contract 7 cents all around, and the shearers furnish their own board, cook, etc.)	2,030 00
Cost to haul wool to the nearest station at 25 cents per hundred-weight	58 00
Total expenses of labor	7,668 00

Experience shows that it is best to divide sheep into bands of 2,300 to 2,500 head, about what one man can conveniently manage; pasture can be best utilized by this method. I seldom have occasion to change pasture. I only corral ewes during lambing. Confining sheep produces disease and soils the wool. Sheds would sometimes save young lambs during long or cold rains, but such shelter is impracticable with large flocks. Sheep are never fed. Rams run with ewes August 1 to October 1. Lambing season, January 1 to March 1. First shearing, April and May; second shearing, September 1 to November 1. Lambs are castrated from two to six weeks after birth. Some keep one goat with a thousand sheep; they are supposed to lead across rivers and over rough mountains. Average for 1,000 sheep is 2,000 acres, when there is no waste because of chaparral or cactus. Our object is to grow good mutton sheep that will shear well; our muttons are worth from $2 50 to $3 50. Cross French and Spanish merinos, one-half each; then a three-year-old wether should dress 65 pounds and shear 9½ pounds once a year, or if sheared twice a year, 11½ pounds of wool. The French give size; the Spanish give quantity and quality to the fleece. Average, 16½ cents per pound in 1875, and averaged 7½ pounds clip for the year. My last clip sold at 22½ cents. My present year's shearing is 9½ pounds, and I call it "good wool". All old wethers are sold for mutton. One ram is the usual, but too small, apportionment to 100 ewes. I do not believe in in-breeding; renew often. Scab does not give much trouble to good shepherds. Death proceeds mostly from poisonous weeds. Estimated loss from all causes, 5 per cent.

Flock K contained 50 rams, 5,600 ewes, 3,150 wethers, 3,350 lambs; total, 12,150.

17,500 acres of land owned, at $2 50	$43,750 00
Buildings and fences	5,000 00
Equipment in vehicles, harness, tools, etc	1,150 00
Horses	1,100 00
Stock of sheep	29,000 00
Total investment	80,000 00
Men employed throughout the year:	
10 men, at $20 per month, board included	2,400 00
3 men, at $25 per month, board included	900 00
1 man, at $30 per month, board included	360 00
1 man, at $35 per month, board included	420 00
Total	4,080 00
At lambing, 5 men for 6 weeks, at $25 per month, board included	187 50
At shearing, 35 extra men for 20 days, or 7 to 7½ cents per fleece, 10,600 fleeces last shearing (1,550 old wethers left unsheared for winter market); spring shearing cost $750; fall shearing $800	1,550 00
Total	1,737 50

Always divide into bands. The wether bands are not changed; others are, according to circumstances. For example, after lambing, 500 ewes and their lambs are kept together for four or five weeks; then two bands are joined. After weaning, 1,500 lambs and about 1,700 ewes make reasonable flocks. After one year yearling bands may be increased. In Los Angeles there is scarcely any mountain range to go to; and what there is is precipitous and barren. In San Bernardino and in San Diego there is more, but most such range is owned and occupied summer and winter, so that practically there are no mountains to resort to in southern California. Our only changes are to leave the adobe soils when they grow wet and soft and occupy the firm pastures.

Always corral at night, because of coyotes. The presence of these beasts costs me at least $1,000 per annum; the necessity of corrals causes scab, fills the wool with sand, and harms the young lambs. Never use sheds. We keep about 20 acres for hay for horses

and cows. The rams get some of it. It is not fenced, because the anti-fence laws save us that expense. Rams serve from May 15 to June 15, and lambs are dropped from October 15 to November 15. Spring shearing is in March, if there is not too much rain; fall shearing begins the last of August. For winter lambing, from January 10 to February 25, the service is from August 10 to September 25. The object of our early shearing is to take off the wool before the alfileria seeds ripen, which, gathered in the wool, harm it greatly. Fall shearing is simply when convenient, for the wool is then full of seeds and dirt anyhow. Lambs are castrated two or three weeks after birth. We never use goats; they travel too much.

The two most difficult points in the business are to start the delicate, fine-bred lambs in life, and to keep down the "scab". Lambing requires extreme care; twins cause the most labor. It is well to tie them together until July 1 with a strip of cotton cloth, 4 feet long by an inch wide, but this must be untied at night. Afterward mark them with lampblack, both in the same way, so that if separated they may be placed together again. In times of storm or frost the corral should be watched at night, that the suffering lambs may be warmed by a fire or in snug pens, which should be made here and there about the corral. If a sheep loses her lamb we give her another, sometimes putting the skin of the dead lamb upon the one taken to replace it. Otherwise the mother and the new lamb are closely confined until the little one is adopted, and in the mean time the ewe must have green feed to keep up her flow of milk, and the lamb will sometimes need the bottle. Ram lambs should be castrated as soon as possible. In cutting the tail as short as it should be—about three-fourths of an inch from the body—the cut should be seared with a hot iron. When dipping for scab sheep may be soaked about a minute in a preparation at 120° of heat. It requires two dippings within two weeks to kill scab. We use lime and sulphur in water, one part of lime to four parts of sulphur, and brought to a boil. Then we add in the vat at such rate that one pound of lime and four pounds of sulphur shall make four gallons of dip.

At first we attempted breeding our native sheep to a coarse ram, principally cotswold; but soon abandoned that, and have since confined ourselves to the Spanish merino, sometimes thoroughbred, but usually grades. We seek to produce an animal of fair size, compact form, short legs, good bone, large quarters, well wooled, and having few wrinkles. We want to depart the farthest possible from sloping rump, cat ham, and thin shoulders. My ideal will weigh 80 to 100 pounds for the ewe, and 100 to 120 for the wether, the former to dress 45 to 50 pounds, the latter 55 to 60 pounds at three years old. From this sheep will come a fleece, two shearings in the year, of 7 to 10 pounds in the dirt; this from a breeding ewe. A grown wether will give 10 to 12 pounds. Coarse-wooled sheep are not profitable in a warm climate. Their wool product is too small; therefore the French merino is the only competitor with the Spanish in our section. The French are large sheep and heavy shearers, but the wool wants length and fineness. Their legs are too long, their shanks too large, shoulders thin and sharp; their quarters are not developed; their wool is not for the manufacturer, nor their carcass for the butcher. We get in the Spanish merino the opposite characteristics of the French, and the former herd well in large flocks and take readily what feed is at hand, thus ranging closer and in larger number. These habits compensate for the larger carcass and the greater amount of coarse wool on the French merinos.

My last wool sold for 22 cents spring clip and 13 cents for the fall, and my average clip through this year is about 9 pounds. Our wool is not classed according to fineness. It is of a low grade anyhow, because of the burr clover in it. I believe it is the lowest-priced wool in our country. Price is regulated by length of staple, its shrinking capacity—*i. e.*, how much it will lose in scouring, because of the oil and dirt—and the amount of seed it holds. One ram is apportioned to sixty or seventy ewes, with a new supply of rams every other year, retaining the choicest old bucks. No disease noticeable but scab. The largest income is from wool, but we raise mutton also. Estimated average loss from all causes, 3 per cent.

The demand for mutton in California is much greater in proportion to the population and the number of stock than it is in Texas.

The best wools of California come from the northern section, especially from the counties of Humboldt, Mendocino, and Tehama. The poorest wools are those from southern California—Los Angeles and San Bernardino counties. The northern wools are better grown; they are brighter and freer from seeds and burr. Brightness results from the washings on the sheep's backs by the heavy rains of winter and spring. The shrinkage of the northern wools in scouring is less by 10 to 20 per cent. than that of the southern clip, which brings 5 to 10 cents less price. The flock-owners of the south, however, claim compensation for this apparent difference of market return in the extra weight of southern fleeces. As a rule the southern sheep are better bred. Against the favoring rains of the north there is in the south a better pasture, especially that of burr clover. The quality of wool throughout the state has improved as the sheep have advanced from the original chaurro to the present class. The coarse, light, kempy wool has given place to length, fineness, evenness, and weight. The theories of breeding for these desired qualities have been set forth in the foregoing description of sheep-husbandry.

The composition of certain flocks of California sheep aggregating in 1880 258,756 head was as follows: Rams, 2,838, or 1 per cent. of the whole; ewes, 130,780, or 50 per cent.; wethers, 69,206, or 27 per cent.; lambs, 55,932, or 22 per cent.

The number of lambs dropped to each 100 adult ewes was 80; of these 43 survived to yearlings. This small natural increase is owing to the inclement weather of the winter of 1879-'80.

The estimated annual loss among sheep was 7.8 per cent., attributed to the following causes: Poisonous weeds, disease, winter storms, and wild animals. This loss is probably less than the average. The business is subject to very great fluctuations; local droughts sometimes produce sweeping losses, and a combination of favorable circumstances will sometimes result in exceptional gains in the number of animals and in profits.

The estimated average value of sheep during 1880 was as follows: Rams, $18 57; ewes, $2 12; wethers, $2 22; lambs, $1 88.

The estimated average live weight of mutton-sheep was 104 pounds; dressed weight, 54 pounds.

The estimated average wool clip during 1880 was, for rams, 14 pounds; ewes, 6.33 pounds; wethers, 8.11 pounds; lambs, 5.40 pounds.

According to returns compiled by Mr. G. W. Bond, special agent of wool manufactures, there were in California in 1870 five woolen manufactories, employing 659 hands, and using 1,928.000 pounds of wool, of a value of $520,485,

the value of manufactured products being $1,102,754; in 1880 there were nine manufactories, employing 835 hands, using 5,024,600 pounds of wool, the value of which was $1,100,180, the value of manufactured products being $1,634,858.

It will be noticed that the best wool seems to be used in home factories. California blankets have a world-wide reputation.

GOATS.

Goats of the ordinary kind, grown for their milk, their flesh, or their skins, were brought to this country in early colonial times, but from the first their use has been mostly in cities and towns, and they have rarely received any considerable attention as farm animals.

The Angora goat, introduced in 1848, and the cashmere (usually confounded in the popular mind) have attracted some considerable attention as herd animals. For the production of flocks they have usually been bred on the common goat (as merinos have been bred on the coarse-wooled Mexican sheep), and some very considerable flocks have been produced in the Carolinas, Georgia, Kentucky, Tennessee, Texas, California, Arizona, Nevada, and elsewhere. They have attained the greatest prominence in California. There is a demand for mohair, but the industry in its experimental stages has had varying fortunes. Full statistics of production are wanting.

An establishment in California for making robes, mats, gloves, and whip lashes has used 30,000 goat skins in a year, half-bred Angora or higher bred. The supply is not equal to the demand.

HOG-RAISING.

LOS ANGELES COUNTY.—The following is an account of hog-raising and pork-packing as it was found to exist in Los Angeles county in 1880. The breeding of swine received new impetus and attention from the local demand of a packing-house established in East Los Angeles in 1877.

While in northern California the county of Butte alone produced in 1880 an estimated total of 184,545 hogs, the whole of southern California, with its five counties of Santa Barbara, Ventura, Los Angeles, San Bernardino, and San Diego, was found to contain only 99,921.

Many facts relating to the raising, marketing, and final disposition of hogs were gathered by a visit to the packing-house of Messrs. Speedy & Co., in East Los Angeles, and by research conducted on many ranches of Los Angeles county.

Hog-raising in Los Angeles county has increased with the progress of agriculture, and has within two years assumed considerable proportions.

Hogs are generally healthy, and it is claimed that the climate is adapted to this class of stock, and the large crops of grain cultivated in many sections furnish needful feed. The varieties of hogs bred in Los Angeles county include the following, viz: Poland-China and Berkshires, both bred extensively; Suffolks and Chesters, both bred to a limited extent; and common hogs, but slightly improved and bred extensively. The majority of hogs found in the county bear strong marks of one or the other of the above breeds, but on many ranches droves of grade animals are found which have been developed from the common variety by the use of thoroughbred boars, many of the latter having been introduced from the eastern states direct and from northern California within the past ten years. The general system of handling hogs for market is to put them on alfalfa or other pasturing during the summer, having good water accessible, and later in the season, just as the barley and wheat crops are in the dough, turn them into certain areas of such feed and let them harvest it. Other breeders turn their stock on the stubble only, having previously cut the grain, and, allowing them to glean the fallen wheat or barley, fatten them afterward on corn. It is claimed by Messrs. Speedy & Co. that corn-fed hogs are much superior to those fed on barley or wheat, since they not only weigh heavier but yield a better quality of bacon and hams and other products for packing. This firm say that it is difficult at all times for them to get good prime stock for slaughtering. They assert that most farmers wish to sell their animals just as they are beginning to take on flesh and get into good shape, as they are afraid of expending too much feed on them. From just before harvest until about December many barley-fed hogs come into market fattened on the standing grain or on the stubble. Numbers of these are fairly well fattened, especially those allowed to harvest the grain in the dough, but they are not popular with the packers for the reason that the barley points or burrs often perforate the flesh and cause boils, which, not being detected and cut out in the process of packing, sometimes damage sides of bacon and hams. No treatment which the meat undergoes will destroy this corruption or prevent its spread. The corn-fed hogs begin to come into market about the middle of November, and from that time until the ensuing summer they are constantly offered for sale. Those barley-fed, though liable to the objections pointed out, are largely consumed by the packing-house at Los Angeles; but the hogs fattened on wheat are not at all esteemed and are seldom killed by them in large numbers, wheat being regarded as a poor feed for putting on solid fat. Los Angeles county hogs are marketed at from ten to twenty months of age, when they weigh from 175 to 300 pounds, averaging, according to the books of Messrs. Speedy & Co., 200 pounds. Previous to the opening of the packing-house in east Los Angeles farmers were obliged to ship their product to San Francisco or sell to the limited

local markets. By the creation of a nearer market encouragement was at once given to the production of swine. Although the latitude was thought by most people unfavorable to pork-packing, this firm in 1878, the first year of business, slaughtered and put up in the form of bacon, hams, and lard upward of 10,000 animals bought in the counties of Ventura, Los Angeles, and San Bernardino, beside supplying some considerable number to the construction camps of the Southern Pacific railroad. The firm employed from 30 to 50 men during 1880. Packing during the summer months to the full capacity would not be feasible in the Los Angeles climate. Cash payments at 3½ to 4 cents on foot were made for all fat hogs offered. At that time there were facilities for slaughtering and packing 150 hogs per day, and during 1880 up to the middle of November the number of animals killed had been 20,000, beside a considerable number handled and shipped alive to the construction companies of the Southern Pacific railroad in Arizona and New Mexico. The consignments were to New Mexico chiefly, to Silver City, in Grant county, and to other mining camps of that territory, while Reno, Nevada, and the towns to the south of that point received the remainder. About 80 per cent. of the production reached New Mexico, and 20 per cent. went to Nevada; none was marketed in northern California.

In large cities the daily sale of a large portion of the scraps, heads, feet, livers, and other parts of slaughtered hogs, added to the proceeds derived from the utilization of offal, is made to contribute largely toward paying for the cost of slaughtering if not to pay that cost entirely. At the Los Angeles packing-house no demand exists for these scraps, 24 pounds of which on an average for each hog killed had to be thrown away, and a large amount of food was lost to the country and to the economy of the establishment. The offal also was entirely lost, as no means have been taken for appropriating such material to use. All hogs that could be transported by rail were brought by that means direct to the yards of the slaughter-house. The hogs thus arrived in better condition than when driven, though a shrinkage was always noticeable even with the best system of transportation, and was ascertained to average in the case of prime animals about 4 pounds during a day's travel. Such a loss of weight is due to the freight and the annoyances caused by crowding in a stock car, but after the first day the proportion of shrinkage is less. In shipping hogs of, say, 300 pounds weight from Los Angeles to San Francisco, 482 miles, a falling off in weight of 11 to 12 pounds occurred under the most favorable circumstances, as noted in actual experience. According to the statements of the firm, although many shipments of hogs have annually occurred from Los Angeles to San Francisco, the transactions have brought little profit to the breeders, and therefore the business was not in much favor until the erection of a local packing-house.

According to Special Abstract No. 9, Manufactures, Tenth Census, 51 meat-packing establishments in California slaughtered, during the fiscal year ending June 30, 1880, 111,668 beeves, having an average live weight of 1,061 pounds, valued at $2,966,270; 414,185 sheep, average live weight 90 pounds, valued at $1,009,946; 235,777 hogs, average live weight 211 pounds, valued at $1,805,482; aggregate value of all animals, $5,781,698. There were 54,530,967 pounds of beef sold fresh, 120,000 pounds canned, 7,272,610 pounds salted or cured; 18,719,399 pounds of mutton sold fresh; 12,296,236 pounds of pork sold fresh, 9,654,136 pounds salted; 9,970,414 pounds of bacon and hams; 4,388,650 pounds of lard; aggregate value of all products, $7,953,914.

The customs returns show that during eighteen months ending December 31, 1880, California exported 780,466 pounds of bacon and hams, valued at $102,077; 1,343,556 pounds of beef, salted or cured, valued at $69,127; 650,919 pounds of lard, valued at $62,071; 550,855 pounds of pork, valued at $33,577; and preserved meats to the value of $50,242; aggregating $317,094.

The exports of neat cattle by customs districts are now comparatively insignificant, being for the calendar year 1880 but 430 head, valued at $17,048.

MOVEMENT OF LIVE STOCK IN CALIFORNIA DURING 1880.

From California.	Destination.	Cattle.	Sheep.	Swine.	To California.	Source.	Cattle.	Sheep.	Swine.
Total		7,500	179,797	6,400	Total		65,176	362	51
By drive	Oregon	5,000	5,000		By drive	Oregon	5,000	* 362	
By drive	Washington territory		7,500		By drive	Arizona	300		
By drive	Montana		72,000		By railroad	do	300		
By drive	Wyoming		30,000		By drive	Nevada	8,000		
By drive	Colorado		10,000		By railroad	do	51,345		51
By drive	Utah		15,000		By railroad	Utah	231		
By drive	Nevada		10,000						
By railroad	do	570	6,357	4,286					
By railroad	Utah		1,007						
By railroad	Arizona			1,000					
By drive	do	1,500							
By sea	Mexico	256	21,903						
By sea	Mexico and China	174	1,030	1,114					

* Only rams for breeding purposes.

Of the above, northern California contributed 5,000 cattle and 71,500 sheep; central California, 744 cattle, 36,394 sheep, and 5,400 swine; southern California 1,756 cattle, 71,903 sheep, and 1,000 swine.

CATTLE, SHEEP, AND SWINE IN CALIFORNIA AS REPORTED FOR CERTAIN YEARS.

Year.	Authority.	Cattle.	Sheep.*	Swine.
1769	Bancroft MSS	200	100	
1778	....do	500		
1800	....do	74,000	88,000	
1830	....do	185,000	165,000	
1831	Alex. Forbes' History of California	216,727	153,455	839
1835	John Forster, esq	338,000		
1850	United States Census (on farms)	262,659	17,574	2,776
1860	....do	1,180,142	1,088,002	456,396
1862	Accepted estimates of California cattle-men	3,000,000		
1870	United States Census (on farms)	631,398	2,768,187	444,617
1875	Department of Agriculture	1,438,800	6,750,000	363,300
1876	....do	708,240	6,406,825	
1877	....do	721,793	6,142,409	430,147
1878	....do	525,565	4,655,543	372,642
1879	....do	593,933	3,755,781	322,650
1880	United States Census (on farms)	664,307	4,152,349	603,550
1880	Reports of county assessors	621,361	5,122,987	477,434
1880	Tenth Census (on farms and estimated unenumerated ranch and range stock)	815,044	5,727,349	868,419

ESTIMATED CATTLE, SHEEP, AND SWINE IN CALIFORNIA JULY 1, 1880.

Sections.	Sections defined.	Approximate average acres of stock occupation.	STOCK.		
			Cattle.	Sheep.*	Swine.
	Total	69,850,000	815,044	5,727,349	868,419
Northern	North of a line running from bay of San Francisco east and north of the counties of Contra Costa, San Joaquin, Sacramento, and El Dorado, to intersection of 39° latitude and 120° longitude.	30,000,000	366,773	1,852,691	438,032
Central	South of above line to include San Luis Obispo, Kern, and Inyo counties	30,000,000	382,807	2,850,499	329,206
Southern	South of the counties just named	9,850,000	64,712	1,023,306	99,921
	From Indian returns		752	853	360

* See note to Texas tables, p. 31.

Total area of California, square acres, land surface 99,827,200
No available pasturage in excess of occupied pasture.
Total population 864,694

AVERAGE DENSITY OF STOCK (CATTLE AND SHEEP) OCCUPATION.—Making one head of neat stock the unit, and considering five sheep to equal one head of cattle in consumption of pasture, we have 1,960,514 units of stock occupying 69,850,000 acres, or 35.63 acres to the head.

ARIZONA TERRITORY.

GENERAL FEATURES.—Arizona has a surface of table-lands of widely different altitudes and traversed by many imposing mountain-chains holding valleys between them; besides which the most remarkable cañon feature also finds development, and affects, as Professor Newberry expresses it, the "overdraining" of the territory. In the southwest a vast stretch of plain-like country has a low altitude, limited rainfall, and a torrid temperature, and produces on its barren soils a meager vegetation inadequate, except in a few limited localities, for the permanent needs of domestic animals, while there is a scarcity of water. North and east from this desert expanse, which has an estimated area of 11,000,000 acres, the land rises gradually in tables or mesas, more or less broken by numerous ranges of mountains or hills, usually winding northwesterly and southeasterly, and giving the same common direction to the larger valley depressions. The streams often break through the ranges by narrow transverse valleys.

The Colorado plateau, which extends northward beyond the territory, is estimated to occupy upward of two-fifths of the entire area of Arizona, and has many spots on its outskirts of value for grazing, though the major portion is arid and cut by cañons impracticable for habitation by man or beast. Between the desert of the southwest and the edges of this plateau, as well as in southeastern Arizona, where the extension of the plateau

ceases, is a broken fertile region containing the best pasture-lands of the territory. Temperature and vegetation change with the elevation of the western slope until about the headwaters of the Gila, San Pedro, Salt river, Rio Verde, and Bill Williams fork, where the seasons and the facilities for pasturing flocks and herds are generally favorable.

The system of cañons of the Rio Colorado is developed to its most imposing extent in the plateau, and, by their number, extent, and extraordinary depth, they render an immense area worthless and practically inaccessible. The surface is dry and rocky, with little herbage, and all living water moves at such a depth below the surface that occupation would be impracticable. The grass-bearing areas favorable for herds during winter comprise those valleys of the elevated region generally beyond the confines of the Colorado plateau that are drained by rivers or fed by lasting springs available as drinking places. While the lowlands constitute the feeding-grounds during the winter season, a general recourse is had in summer to the pasturage of the foot-hills and mountain slopes, or to those mesas having adequate water.

SOUTHERN ARIZONA.

It does not seem probable that previous to its transfer to the United States the region now constituting Arizona was ever extensively occupied either by cattle or by sheep. Up to 1865 live-stock interests were small and uncertain, owing chiefly to the hostility of the Apaches and other Indians. The passage of immense drives of both sheep and cattle from New Mexico and Texas, to meet the demand of mining camps in California, occasioned between 1849 and 1870 the temporary use of grass lands in Arizona. These movements have little direct connection with the permanent stock of the country; for although the Mexicans of the Santa Cruz valley often secured foot-sore animals from drivers en route west no amount of vigilance enabled them to grow many cattle, owing to the Indians. Aside from the half dozen sparsely populated towns the only demand for beef and mutton up to 1870 was at the military posts. These distant garrisons were supplied from California and New Mexico for many years, but later the cheapness and abundance of neat cattle in Texas induced many army contractors to buy them.

The first recorded instance of an attempt at cattle-growing here by an Anglo-American was that of W. S. Oury, who bought, in 1858, at Tucson 100 Illinois heifers and 4 bulls from a drover who was taking them through for the improvement of California herds. This herd or its increase was confined to the Santa Cruz valley for sixteen years. About 1874 the decreased apprehension of theft encouraged the owner to give his stock more freedom on the range, but owing to Indian raids, and in spite of all precautions, the present holding of Mr. Oury numbers only 400 head. Eleven years after Mr. Oury's purchase H. C. Hooker, a member of the firm of Hinds & Hooker, then holding contracts to furnish the military department of Arizona with beef, moved 4,000 Texas beeves and stock cattle to the neighborhood of Baboquivari peak, near the Mexican line, from which point the fattened animals were distributed to the southern garrisons. This was the initial step in ranging a heavy stock where hitherto the activity of the Apaches had prevented any but the most limited and guarded cattle-growing. As it was, Hooker lost 400 beeves, stampeded by the Indians during the two years of his occupation of that region. Contemporary with the occupation of the Baboquivari range, Mr. Marsh, of the firm of Marsh & Driscoll, began with 400 Sonora cattle in the Santa Cruz valley, below Tucson, where they suffered severe losses at the hands of both Indians and Mexican cattle thieves. In the fall of 1870 there were upward of a dozen Mexican cattle-owners in the Santa Cruz valley, each with 20 to 75 head of Mexican cattle. During 1872 H. C. Hooker located the Sierra Bonita ranch in Sulphur Springs valley, holding there 10,000 Texas cattle brought in to supply a contract for army and Indian reservations. It was not, however, until 1874 that this pasture ground became a breeding range, beginning with 1,500 cows, which had been driven in the previous year with those for garrison and agency use. The close of 1873 found several important water claims taken up. Among these the most notable were Sanford's ranch, near Pantano, and Steele & McKenzie's, in Sulphur Springs valley, each stocked with several hundred head from Texas. It is unnecessary to particularize other important parties further than to say that Hooker, Baker, Marsh, Steele, McKenzie, Sanford, Aguené, Hughes, Oten, and many others invested their means and risked their personal safety in developing stock-raising in Arizona. Cattle from Texas constituted the largest individual holding, while the Mexican breeds, handled generally in small herds by Mexican rancheros, made up in large part the remainder. In 1876, 400 Oregon cows brought to the Sulphur Springs valley, a few Utah dairy herds brought to the San Pedro and the Gila by Mormons during 1876–'79, and several good lots of American blood, fleeing from California droughts in 1877, contributed to improve the quality of the stock. Excepting Oury's American cattle brought in in 1858, and their descendants, the stock of animals was essentially Texas or Mexican until 1873, when a few graded bulls from Kentucky and Illinois were first used on the ranges of the Sierra Bonita in Sulphur Springs valley. From 1876 to 1880 a very considerable extension of the business occurred, and many outlying forage grounds in Pima, Pinal, and Maricopa counties were stocked with trail herds, chiefly Texans and Mexicans. California buyers have latterly taken the surplus beef of lower Arizona.

The approaches by which trail drives can reach the territory are difficult and hazardous from almost every direction. This fact, combined with the comparatively limited production, never before equal to home consumption, has kept good Texas, California, and Utah cattle at a high valuation, and the inferior and cheaper Mexican stock have been largely utilized for government purposes.

The grass lands of southern Arizona are practically confined to the watered valley and hill areas lying east of the Rio Verde, north of the Gila, and east of the 111th meridian south of the Gila river. West of these boundaries the country is largely barren, broken by peaks or cut by deep cañons.

THE LOWER GILA STOCK RANGE.—From Agua Caliente westward for some 30 miles along the valley of the Gila a badly grassed and generally impoverished stock range yields support to about 800 head of neat stock, the property of some half dozen settlers located at the more favored spots. The Gila at these points retains sufficient water during the seasons of greatest drought for the local herds, but for miles on either side of the river there is no permanent water. It is only after November or December rains, or occasional late spring storms, that there is a partial supply in the reservoirs of the adjacent country. The country is mostly a low, plain region with its frequent mesas of sand and gravel, interspersed near the stream with tracts nourishing the hardy gietta grass and some salt grass, the mesquit and some browse feed. Granite spurs break the regularity of the general level, and at times gravelly beaches or mesas extend back from the narrow valley proper, which, in many instances, merge within a short distance in the surrounding desert. The climate is dry and hot, and, in 1880, no rain fell after February until late in December. Stock are said to suffer much from exposure to the intense heat of the sun in summer, when, during the day, they have only the scanty shade of the mesquite and willow brush, making little effort to secure food until evening sets in. Sudden changes are said to occur at the winter season that prove a great hardship to cattle, though for no long period. In reality, these cold winds which sometimes accompany rains in December and January are of a temperature so mild that a Colorado or Wyoming cow would not be inconvenienced, but in this hot region the change chills stock. It was not ascertained that cattle ever actually perished from exposure unless after a season of prolonged drought, when the forage became so scanty as to reduce the flesh of range herds, making them more susceptible to inclement winds. The pasturage of the Gila river range consists of gietta and salt grass, and the so-called six-weeks grass. The six-weeks grass appears after rains over wide districts at other times perhaps barren of even the gietta grass, and is not of much strength or value as a stock feed. It has a succulent blade from 5 to 10 inches high. Cattle devour the six-weeks grass greedily, until, after four or five weeks' growth, it withers under the increasing temperature and entirely disappears, leaving them in little better flesh than when it appeared, though considerably brightened up by the effects of green feed. Along the Gila itself certain shrubs serve as fodder for a certain space of time in the spring. Some years there is a plentiful crop of the nutritious mesquit bean. Of the herds grazed on Gila below the Agua Caliente the majority are half or full bred Mexican cattle, though one herd driven from the range in 1880 to southeastern Pima county had come in from California in 1877. None but the small and hardy Mexican cattle are said to really thrive on this desert border grazing. Losses among cattle result from alkali either in solution with drinking water or with salt grass, and from starvation when winters occur with insufficient rain. A ranchman who moved his cattle, some 350 head, from the Gila to southeastern Arizona reported that he suffered many thefts by Indians otherwise friendly.

FARM CATTLE OF SALT RIVER (RIO SALINAS) VALLEY.—The farmers of the Salt River valley in the neighborhood of Phœnix and above, for some 15 or 18 miles, hold many small herds of dairy cattle pastured on alfalfa and stubble fields grown by irrigation and made to produce heavily. The settlers have transformed the valley for a distance of 15 miles in length, by 3½ miles in width, into the most valuable agricultural tract in Arizona. The possibilities of the region seem great, but the population, composed of settlers from Texas, Missouri, and California, were involved in endless trouble over water claims which delayed progress. Dairy cattle were found to be of a quality superior to the range stock in other sections of Maricopa county. Under the no-fence statute, cattle-holders, who were farmers as well, used stockades of living Lombardy poplar, willow, or cottonwood, with wire or brush woven between them.

The summers have an intense glare and heat. Snow sometimes falls about Phœnix, but has never been known to lie on the ground, and frosts begin to visit the locality in December. Three flocks of sheep were owned in Maricopa county, being grazed on the Rio Verde and in Tonto basin.

HOG-RAISING IN SALT RIVER VALLEY.—A good and marketable class of hogs was bred on many of the farms. The practice followed in feeding was to allow the hogs to roam on alfalfa until the harvest, when they were turned on the barley stubble and afterwards fattened with a few weeks' feed of barley, little corn being raised. They were commonly slaughtered at 12 to 14 months of age. The bacon, ham, and lard go to Tombstone, Prescott, Tucson, and other towns of the territory. In 1879 about 3,500 hogs were packed by resident farmers, while a number of shipments were made of live hogs over the Southern Pacific from Maricopa Wells, the stock having been moved along the severe trail between Phœnix and the railroad, a drive only practicable in the winter. The general grade of hogs raised was good, a number of well-bred Berkshire and Poland-China boars having been introduced from California in the last two years. So far as weights are concerned the shoats from the Phœnix farms compare well with California hogs; a lot raised by Messrs. Orme & Greenshaw and sold to go to Tucson by trail and by railroad transportation in November, 1880, weighed before starting 220 pounds. Some herds averaged, it was said, better than this, and frequently an individual hog, twelve to fourteen months old and barley-fed, weighed 300 to 400 pounds. The principal butcher of Phœnix stated that these hogs killed as firm and choice as any that he had ever handled. The absence of corn necessitated the use of barley, which seems to produce a good article of pork, although at Los Angeles, California, the local packing-house regarded barley-fed hogs as very inferior to those corn fattened. The quality of the bacon, hams, and lard put up at Phœnix and neighborhood was reported to be very fair.

TAXES; PRICES OF STOCK AND WEIGHTS.—The assessed valuation on live-stock was as follows in 1880: Milch cows, $15 to $20; other stock cattle, $8 to $12; and hogs, 75 cents to $3. The rate of taxation was $3 50 per $100 valuation. Beef cattle sold from the farm districts to Phœnix butchers at $22 to $25 per head. The Mexican and half-breed beeves from the Gila range brought from $18 to $20 when fat. In the Salt River valley cattle-raising is subordinate to grain and hay crops raised by irrigation. No sheep were kept in this valley, but there is a large number of swine.

PIMA COUNTY RANGES.—There are several other isolated valleys containing live-stock west of the Santa Cruz river. In the Sonoita, Baboquivari, and Arivaca valleys cattle ranching by Indians or Mexicans, but on a small scale, was reported. The Papago Indians, who are known to have had numerous horses and cattle from an early date, were using the country of the Papago river and portions of both Baboquivari and Sonoita valleys. The situation of the Papago river, exposed to the parching influences of the surrounding desert plains and naked barren mountain spurs, renders it a precarious location. The wild grasses are poor, and the summer climate is severe on range animals. The vicinity of Baboquivari peak was the scene of the earliest ranging of an extensive stock, and that was by Mr. Hooker, in 1869; the facilities for grazing were of a fair character, used previously by the Indians. Arivaca valley, watered by a small creek, contained several small herds and flocks, and one embracing some 10,000 sheep, together with about 400 Mexican cattle. While the adjacent country of broken mesa lands and foot-hill areas is more or less grassed with the common forage plants, only the country immediately in the vicinity of the streams is used by the ranchers of the valley, whose herds graze in hot weather chiefly on the moist lands. It is not until the Santa Cruz river is reached that really favorable pasture is found, and there such grazing lands as are convenient to water have long since been fully stocked. The elevation of the Santa Cruz valley, estimated at 2,500 to 3,800 feet, gives it advantages in temperature and rainfall. From the Mexican frontier to the vicinity of Tucson scattered ranches occur, controlled in most instances by Mexican cattle-owners. Old ranch sites have been re-established, and every water-claim adapted to the business had in 1880 a herd of cattle or less frequently a flock of sheep relying upon it. At the various adobe hamlets distributed over the course of the Santa Cruz considerable irrigation gradually reduces the volume of the stream, and agriculture is attempted to the extent of the settlers' rights to divert the water. Among the largest ranches, one, that of an American firm, was grazing 5,000 cattle; another 1,500, and several 500 to 800 head each. Texas and Mexico furnished the original breeding herds of this region, the former state reaching the largest number. In the opinion of many judges this part of Arizona is unsuited to wool-growing. Only sheep of native Mexican breed, withstanding great privations, thrive on the native forage. Neat stock, however, fatten on these plants. A broad, rolling upland tract is situated east of the Santa Rita mountains, with the Sierra Colorado confining it on the north, the Patagonia and Huachuca ranges on the south, and the Whetstone mountains for its eastern barrier. Throughout this sparsely-watered area there are frequent patches of pasture. Permanent water occurs along the base of the Santa Rita mountains, and this region and in the Sonoita and Babocomeri valleys many natural reservoirs temporarily hold rain-water. Several of the largest cattle camps of the territory were placed at the cienega lands above noted, where never-failing springs and an extensive acreage of moist-land vegetation insure in seasons of extreme drought a supply for range animals. This grazing plain, though bordered by the Santa Rita mountains, affords too infrequent wind-breaks against the harsh winds of the one season and too little shade for the powerful heat of the other. The Sonoita valley properly belongs to the Santa Cruz river system, of which its stream is a branch; the Babocomeri valley likewise is drained by a prong of the San Pedro extending from the plain south of the Mustang mountains some 25 or 30 miles to its confluence with that stream. In the Sonoita valley were several partially irrigated farms, finding a market in the neighboring mining districts for grain and hay. On the Cienega ranch lands, already mentioned, improvements have in several instances increased the duration of water pools. The mountains are generally destitute of accessible drinking-places, so that there is no highland summer pasturage, the herds occupying in hot weather the cienega tracts and their vicinity. Among the larger stock ranches of this region may be cited the Empire ranch, east of the Santa Rita mountains, 40 miles south and a little east of Tucson, where there was a herd of about 5,000 cattle; and the Cienega ranch, where 23,000 sheep and about 1,000 cattle were kept, the most extensive sheep-holding found in any county in the territory, except Apache. The stock-owners as a whole think the country better adapted to cattle than to sheep, and only Mexican breeds of sheep thrive on the juiceless grasses of this region. The labor of attending to cattle in this section, as of Arizona ranges generally, was comparatively light, since the free movement of stock is restricted by the dearth of watering-places beyond the range on which they are located as well as by the infrequency of severe storms to scatter and drift herds.

SAN PEDRO VALLEY.—The valley of the San Pedro, extending from the Sonora line to the Gila river, is occupied at intervals by small numbers of cattle or sheep. The settlers in the valley are Mexicans, Mormons, and California and Texas cattlemen, holding usually but small herds. The settlement of this valley by Mexicans occurred about 1873–'74, and in 1876 a colony of Mormons settled below the Tombstone crossing of the San Pedro, with small lots of dairy animals. In 1880, with the exception of a Texas herd of 2,500 cattle in the Mule pass and another of 3,600 on the Babocomeri ranch on the tributary of that name, the holdings were mostly of from 50 to 250 head of cattle each. There were two flocks of Mexican sheep of 5,000 and 3,000 head respectively, ranged by men settled, in one case, near camp McDowell; in the other, near the Tombstone crossing; and small flocks were met with in the valley.

San Pedro valley passes north through several detached mountain spurs, narrow in places and then again widening with mesas that stretch to the hills. The Babocomeri creek, a lateral stream, courses through a basin of considerable merit for stock, as the plain or bench lands cut by the river are finely grassed and the water is permanent. Unquestionably the country adjacent to the upper waters of the main branch, about the bases of the Huachuca and San José mountains and Mule pass, is of a better description than the areas inclosing the San Pedro north of the junction of Babocomeri creek, which for many miles are sandy and almost barren stretches, only relieved by the gietta-grass and greasewood, or in some localities by abundant mesquit brush and mescal, with varieties of the cactus, valueless to cattle. The two large herds were Texas cattle. The Mexican cattle were owned by Mexicans from Sonora. On the lower San Pedro a remarkably fine herd was located in 1877, composed of graded shorthorn and Devon cattle. These animals, now numbering 300 head, were brought by rail to fort Yuma, thence by trail to their present range, having been intended for a ranch in the province of Durango, in Mexico. The mining districts furnish the market for beef-cattle from the San Pedro. The various estimates obtained placed the cattle ranged in the San Pedro valley within Arizona at not over 8,000 head, and sheep at not over 10,000 to 12,000.

SULPHUR SPRINGS VALLEY.—This valley extends from the Santo Teresa mountains in a southerly direction for more than 100 miles beyond the Mexican border, draining northward to the San Pedro, thence to the Gila and Colorado rivers, and northwest to the Yaqui river, in Mexico. It has an average width of about 15 miles. In climate, location, and abundance of forage-plants it is particularly adapted to the ranging of neat cattle; but a serious obstacle to utilizing many thousand acres of its area is a deficiency of living water. The natural springs and cienegas were already in use in 1880, with between 18,000 and 20,000 cattle. Of a singularly level surface, the Sulphur Springs valley is also almost wholly free from damaging brushy chaparral, and but few species of the cactus, and these of small size, grow here. About latitude 32° 30′ a low divide, hardly noticeable to the traveler, extends across the valley and diverts north and south the drainage of the country. Araivaypo cañon and Cottonwood creek convey the surface water to the northern slope toward the Gila, while to the south is the remarkable broken chain of cienega lands, which in the spring seasons have a considerable flow of water. The cienega at the Sierra Bonita ranch at the divide is said to mark the central point to which the sources of the Yaqui river may be traced, although it is some distance before it develops into a flowing stream. The mountains completely environ the valley, except where the drainage is toward the Gila, and the Yaqui makes its escape. The bases of these chains, with the irregular surface afforded by their foot-hills, contain the localities chiefly occupied by stock; though cattle prefer the lower valley, especially in winter, when storms prevail in the high lands. At intervals the face of the uplands is broken by cañons, all holding running water at the rainy seasons but dry or uncertain later. The courses of these outflows are often fringed with cottonwood, sycamore, and post-oak timber, while among the broken foot-hills the post-oak grows plentifully and furnishes shelter to herds. Among the cañons of the Sierra Bonita and the Chiricahua mountains a large amount of fir and yellow pine yields timber for a military post and the mines. Most of the valley is destitute of shelter for any stock, except where the timber occurs or where the arroyos reach down on the plain, and some deem the valley on this account too exposed for cattle. But the foot-hills, with their wind-breaks and tree foliage, are easily accessible. The testimony of local herdsmen showed that cattle seemed to understand the country and its change of temperature to a singular degree; often animals were seen breaking for the center of the valley when the uplands were visited by a squall that left the mesas unaffected; again, if a harsh wind swept the plain, they had been observed leaving the levels and seeking the favorable shelter of the irregular mountain bases. At the date of visiting the Sierra Bonita ranch (January 1) the weather was said to be the coldest encountered that season; during the night ice 1½ inches thick was formed and the ground remained hard until about noon; that was the severest part of the cold snap. This inclemency was not intense enough to impede the motion of the endless belt used in drawing water for a large herd of cattle even in the early morning. Snow occurs during the late fall and winter, and has been known to fall to a depth of 4 or 5 inches, but within forty-eight hours it disappears without causing any annoyance or injury to the grazing; it is regarded, on the contrary, as of assistance to the growth of forage. During the summer this section is visited by no such intense heats as prevail in southwestern Arizona, so that its average condition of temperature may be classed as fairly temperate.

The ranch sites are usually from 10 to 15 miles apart, in several instances supplied with water by artificial means, such as bringing it from the mountains in pipes or by sinking wells. A ranch holder in the valley 10 miles north of the Southern Pacific railroad had sunk a well on the central plain, and at 30 feet depth secured a quantity of water ample for somewhat over four hundred American cattle. At the Sierra Bonita ranch, carrying 5,500 cattle—the largest herd in Sulphur Springs valley—but few strays were found on the event of the spring and fall rodeos, a circumstance that indicates the tendency of separate herds to hold their special range. Sheep-raising had been attempted, but without success, and only two flocks of mutton-sheep, retained for the settlement and for garrison supply, were said to be ranging in the entire basin. From a resident who tried the experiment of wool-growing, it appeared that the forage is unsuitable. A flock of 6,000 had been grazed on the Gila slope of the valley for two seasons previous to 1880; but the increase was so slight and the shear so small from the inferior condition of the stock that the owner removed them to Apache county.

Stockmen throughout the valley hold their ranges in most instances merely by the possession of the water that controls the surrounding grazing. Several of the largest herd-owners have secured a government title by depositing funds with the surveyor-general pending local survey of the land adjacent to such water privileges.

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The digging of a well insures to the projector the sole benefit of the locality; and in one instance a mountain spring conducted by a pipe has given a ranchman entire use of a foot-hill range. Most of the settlers in the Sulphur Springs valley commenced operations between 1873 and 1878 with cattle of Texan breed and a few of the Mexican breed.

One California herd and one from Oregon were notable exceptions to the average quality of the stock of the valley. In only one instance have graded sires been introduced; though all herdsmen were, in 1880, using the native (American) bulls among their herds. The markets reached by beeves were the mining camps and garrisons at the forts.

The location of the Sierra Bonita ranch was first made in 1874 by its present proprietor, Mr. H. C. Hooker, to hold large droves of Texas cattle for government use; in the same year he made it a permanent breeding ranch, with 1,500 selected Texas cows. In 1874, and again in 1876, high grade shorthorn and Devon bulls were brought to the ranch from New Mexico, coming originally from Illinois; in the latter year also a number of good American sires were purchased and driven to the Sulphur Springs valley from Oregon. The proprietor deems a half-breed shorthorn or Devon about as high in grade as is profitable in the climate, loss during acclimatization of blooded animals being imminent. Of some pure-bred shorthorns brought from Kentucky a majority died the first year and a high percentage of the high grades similarly perished.

Five springs and two wells constituted, with several cienegas, the permanent water of this location and held tributary to their supply a territory upward of 25 miles square just as securely, under the existing condition of affairs, as if the claim had been fenced. Included in this tract were between 8 and 10 miles of cienega land, over which in spring, winter, and fall surface water flows at intervals, often for several months at a time.

In the summer of 1880, the meadow tracts of the valley were destitute of water, for the first time for twelve years, and perhaps longer, in consequence of the drought of the previous year. The usual supply at the cienega tank near the ranch was made ample by a well of 25 feet, which relieved the needs of the stock accustomed to the vicinity. Various measures have been taken to develop and husband the required water: in one instance underground piping conveys a foot-hill spring, which irrigates a small garden and furnishes water for cattle; several natural tanks along the cienegas have been scraped out, the bottoms made solid, and the water rendered much more permanent. Lowland adjacent to the camp to the extent of 150 acres was inclosed, where a band of mares during the foaling season was ranged. The hay crop, amounting to 200 tons in 1880, was taken from the swales of the cienegas without fencing or special preservation. Beyond the insignificant inclosure described, the control of the permanent water gave undisputed grazing over 400,000 acres of lowland, mesa, valley slope, and foot-hill. Here were kept from 5,500 to 6,000 cattle.

No regular drives are made for a change of pasturage from winter to summer. In the hot season cattle stay about the permanent watering-places much more closely than when temporary cienega outflows and rain-tanks allow of their ranging more freely. At times during the spring and fall the mountains are extensively penetrated, as numerous short-lived rivulets and cañon springs are then available to stock; but as these highlands are visited by frequent severe storms while cold weather continues, the grazing from December until March is confined to foot-hills and the broad extent of the valley proper. Even at the period of greatest inclination to drift about, only two vaqueros were necessary to hold the stock in check, though a large crew of men were retained for any emergency. The custom in vogue was to rodeo the country about the first week in June, the calves being then handled, marked, and castrated. Sometimes the herd is corralled for this, at other times the bunch would be held while the calves were roped out and branded on the open prairie. At other times, whenever the range riders happened to find a well-grown calf unbranded, it was branded.

The gregarious habit of cattle in that section was encouraged by infrequent and irregular drinking places; the existence of a large proportion of flat range, and the practice of supplying a bull to every fifteen cows, keeping only young and vigorous males with the stock, are reasons that have permitted a very high percentage of increase.

In San Juan valley the number of cattle kept are held by a very insecure tenure, owing to the nature of the country, the distance from organized government, and the proximity of the Mexican frontier.

NORTHEASTERN ARIZONA.

APACHE COUNTY.—It was not until 1867 that what is now known as Apache county, in northeastern Arizona, became the scene of more than transient cattle ranging by white men. The Moquis and Zuñis, as well as Apaches and Navajos and Pueblo Indians, are said to have previously owned some cattle at times, and many sheep. As in the case of the Papagos and Maricopas at the south, it is not unlikely that the natives, particularly those semi-civilized, secured Spanish or Mexican cattle before white settlement of the country.

So far as reliable testimony avails, three bands of neat stock, aggregating 800 head, on ranches taken up along the little Colorado, in the summer of 1867, came into this portion of Arizona and were grazed, under surveillance. They were driven out of New Mexico by W. R. Milligan, Severa Vigil, and an American named Wahls, and were all Texas stock with the exception of 50 Missouri cows. Utah sent a pioneer drive at the same time of 400 head, moved by Felix Holt, who also established a camp on the little Colorado.

The opening of the grazing lands of the little Colorado country was also due in great part to the resolute exploration of the country by mining prospectors and by Mormon immigrants. These people, notably successful in their management of the northern Indians, appear to have been severely handled at times by the implacable Apaches, while border cow thieves plundered them. With a gathering population, Apache county has made a rapid advance since 1876, and, in 1880, few well-watered localities regarded as safe from possible Indian outbreaks remained unoccupied.

During 1880 some cattle were brought into Arizona to fill army contracts; only a limited number of drives being made for this purpose from Mexico and Texas, as the growth of local herds was better calculated to meet the increased consumption. Some cattle were driven in on account of the severe dry weather in New Mexico in the winter and spring of 1880, especially into Apache county.

T. E. O'Brian, esq., of Springerville, furnished the data especially relating to Apache county. Reference has already been made to the occupation of Apache county pastures by one Utah and three New Mexico cattle herds during the winter of 1867–'68, a date that indicates the first settlement of the little Colorado (Colorado Chiquito) region by permanent breeding ranches. Prior to these, immigrant stocks, or those destined for army consumption, had penetrated or traversed the county. In 1880, in the opinion of Mr. O'Brian and the authorities whom he consulted, there was room for many more cattle throughout northeastern Arizona, although the most favorable and accessible grounds furnished with natural water were already taken either by permanent or by periodical graziers. The county is scantily watered, and in the extreme northeast part for some 150 miles very few localities are penetrable by cattle or sheep, owing to the numerous box cañons that forbid passage and whose water is inaccessible. Mr. O'Brian says:

> The natural forage is good all the year round, our fattest cattle being found from October until the last of February, when a slight decline is noticeable. The snow in the valleys falls very lightly and soon passes away; in the mountain valleys and gulches the same may be said, with the difference that in the latter the grass is found green after a snow has melted. In cold, driving storms the many semi-boxed cañons afford ample shelter for stock. Grass here is of a very fine and nutritious quality, chiefly grama-grass (black and white), considerable mesquit and some Bermuda grass, with very little sedge-grass. There is a large amount of mal pais country, *i. e.*, plains covered with small rocks having a volcanic appearance, very favorable ground for sheep, with the grasses indigenous. * * * Although sheep outnumber cattle many times, it is generally believed that a much larger portion of the pasturage is better suited to cattle than to sheep. The prevalence of sheep flocks, and particularly the incoming of temporary flocks from New Mexico, appears to be a continually recurring source of annoyance to the resident cattle ranchmen. Our informant says: "New Mexico contributes no permanency whatever to our stock husbandries; large numbers of sheep are annually driven over the line and herded on our grass lands for several months, to the detriment of the grazing, for which the owners pay not one cent of recompense in the way of taxes, but drive back again their flocks that have fattened on our resources. I am credibly informed that during the past season (1880) not less than 250,000 sheep from New Mexico have for a short time been grazed in Apache county."

Serious but not permanent injury to the wild grasses arises from ranging sheep over them. It requires from two to five years to restore them.

But few stock proprietors hold a title to land by pre-emption or by homestead; and when this is done the property is destined for farming, no pastures being inclosed to contain live-stock, which roam the public domain. Custom allows a settler the individual use of his water claim, though cattle throughout northeastern Arizona are more prone to drift and mingle on a given range than in the other sections, a circumstance due to the occurrence of violent storms.

But few areas have been surveyed, and for this reason there has been little attempt to gain a title to land possessions; nor has it been possible to gain control of more than the prescribed homestead or pre-emption acreage.

To graze 1,000 head of neat cattle at least 50,000 acres of average land are required. The mesa lands, used for herding, it is asserted cannot be utilized for other purposes than grazing.

A small plant in cabin, corrals, and stable, with saddle horses and equipments, costing, exclusive of the cost of the cattle, about $1,200, will cover the outlay for the start in handling 1,000 head of cattle. About $1,450 is thought sufficient to run this herd per annum, including all expenses.

Cattle are handled much as in other parts of Arizona, except that the "drift" from the range seems more frequent and requires more riding after strays than in southern Arizona. The advance in the quality and weight of local herds has been due to better breeding and latterly to the introduction of shorthorn bulls. To insure ready acclimation, graded or thoroughbred bulls should reach the country at the age of eight or nine months. On the open range at least 50 bulls to every 1,000 cows, or 1 to 20, was thought desirable.

At the time of this investigation hides brought from 10 cents to 12½ cents per pound at local market. The beeves, turned off Apache county grass-lands, brought from 4¾ to 5½ cents per pound by the carcass, and at retail they brought 10 to 12½ cents per pound.

NORTHWEST ARIZONA.

MOHAVE AND YAVAPAI COUNTIES.—In 1864, Osborne and Ail entered Yavapai county with a party of emigrants by the way of the crossing of the little Colorado and the Beale route from Albuquerque, having 100 American cattle. The Indians killed or ran off all this stock the first season; but two years later James Baker, at present a large proprietor in that county, drove 70 American cattle from California to Chino valley, where the greatest vigilance alone preserved them from the fate of the earlier herd. Baker again reached the country in

safety the following spring, with 400 New Mexican cattle from the Rio Pecos, and was succeeded the same year by several other drivers from Texas, prominent among them being Wickard and Trusard. In 1868, 1869, and 1870 more droves were brought to northern Arizona, the majority coming from Texas, each being attended with great risk on the way and after its arrival.

Owing to troubles with the Indians along the Colorado river and other causes, California furnished but occasional herds until 1874, when the complete subjection of these natives encouraged a considerable drive from that state to Yavapai and Mohave counties. Other lots of good American cattle were received the same year from Nevada, with several herds from Oregon via the Muddy, Rio Virgin, and Stone's ferry on the Colorado; while Mormon emigrants were accompanied by small numbers of sheep, which they located in many sections of the territory, notably in Apache county. After 1875 no Texan or New Mexican breeding herds entered Yavapai or Mohave counties; but each succeeding year, until 1879, the supply from California continued with occasional drives out of the northern states and territories, mostly associated with emigration from these sections. The increase from outside sources in 1879 and 1880 was confined, in the two counties named, to small herds of dairy cattle connected with the movements of settlers, a few shorthorn bulls in 1880, and beeves to furnish troops stationed at various posts. Nearly all the ranges lying west of the Mogollon mountains, and north of the Gila river were at that date carrying cattle or sheep, the water locations being mostly taken up; and though there was still room for the expansion of local herds and flocks there was not much encouragement for outsiders to drive in and turn stock loose on ranges already partially or wholly occupied. The quantity of beef annually bred in the northwest had never, it is said, exceeded the demand, because of the increasing wants of mining camps and other settlements, coupled with a constantly existing though fluctuating army consumption. In no instance, previous to the fall of 1880, had there been a surplus of fat cattle. In 1880 there was a drive of fat beeves from the Willows, Mohave county, to Kern county, California.

There seems to have been no safety for stock-herds until the season of 1874 and 1875, already alluded to as the time of the successful temporary subjection of Apaches and Navajos by government forces.

Mohave and Yavapai counties are estimated to contain 28,224,000 acres, and they comprise some of the best as well as some of the most worthless portions of the territory for stock. Handling cattle or sheep is impracticable in Yavapai county, except among the scattered settlers of the narrow Rio Virgin and Kanab valleys; even in the neighborhood of those and their lateral water-courses the grassed districts are of meager extent, and the deep cañons impede approach from without and travel within the region.

South of the Colorado and west of the little Colorado, until the vicinity of the San Francisco and the Bill Williams mountains and the divide at the headwaters of the Rio Verde and Big Sandy is reached, the same cañon-lands in the plateau portion, with arid but partly grassed depressions west of the face of the great table-land, exclude settlement, except for a few natives or hardy white prospectors. The so-called Detrital, Sacramento, Hualapai, and Aubrey valleys contain very considerable tracts of wild-grass lands. The permanent springs are widely separated, and too meager for the location of stock. In a general way the occupied portion of northwestern Arizona may be said to extend from the valley of the Big Sandy, in Mohave county, to the eastern limit of Yavapai county, and from the southern boundary of the same to the parched valley and cañon country above designated. Large areas of the occupied region are never traversed by stock, as many isolated spurs and rough, partially-timbered uplands are wholly destitute of springs or streams, and but sparsely supplied with forage plants. The ground ranged by cattle or sheep is limited to the valley slopes and bottom-lands, or to such foot-hill districts and low mesas as are crossed by running streams, or contain in natural reservoirs, called throughout the region "tanks", a sufficiency of water to last the season out. In many parts it is the practice to change the pasture ground twice a year. The first movement occurs about May or early June, when, by recourse to some mountain range or table-land, a variety of fresh grasses is offered to the herds, and the heat and the lack of water prevalent in the valleys are avoided. Where this movement is not feasible the habit with stock, cattle in particular, of frequenting the vicinity of water continually in warm weather proves detrimental to the pasturage, and as the season advances compels animals to move farther away for feed. The extra rain and snow fall of the winter fortunately give stock more freedom to wander, as they can use surface pools or drifted snow. The prominent cattle and sheep ranges of this wide extent of lowland, mesa and upland, are found in the Big Sandy, Santa Maria, Hassyampa, Big Chino, Aqua Fria, and Rio Verde valleys, and in the Tonto and Sunflower basins, as well as through an extensive country embracing the San Francisco and Mogollon mountains. The older occupied portions are the Big Sandy, Chino, Aqua Fria, and Verde; the others, notably the San Francisco and Mogollon mountains and Tonto basin, having until 1875 and 1876 been little used by herdsmen or flockmasters, because of their exposure to Indian depredations.

The Mogollon mountains, from their accessible character, which is simply that of a plateau of an elevation of some 6,000 or 7,000 feet, are eminently suitable for summer grazing. In that season stock can penetrate almost any portion of their surface, except where occasional ragged peaks lift themselves from the general level, or where broken, rift-like depressions and box cañons occur. Most of its extensive areas are provided with springs or tanks of surface-water, while the adjacent foot-hills are coursed by a few streams that extend the limits of pasturable land after early storms have compelled the abandonment of the table-land.

The ability of sheep to range over lands having a meager water supply makes this highland country more valuable to sheep-owners. Throughout most of the ranges in this region the custom is to occupy separate winter and summer quarters. In some valleys, as over large areas of the Aqua Fria and Rio Verde basins, the main water-supply is in the streams draining them. In those cases the absence of a summer resort prevents any very marked change, except such as a greater amount of rain-water or a snowfall in winter permits, when distant tracts of fresh feed can be reached. About Bill Williams mountains and the San Francisco mountains this movement one season with another is very decided. Though said to be abundantly timbered, the San Francisco group affords many areas, nourishing strong bunch and grama grasses, and available when the snow melts.

The isolation of all the smaller and many of the larger valleys is of a marked character; the passage of the mountains or table-lands surrounding them, often difficult at any season, becomes impracticable in winter when snow prevents the free exit of range animals. Reports of temperatures of Yavapai county do not indicate such inclemency as to seriously affect acclimated herds when properly herded. Instances were recorded of a degree of cold about Prescott approaching 10° F., but such extremes are said to be of brief continuance, and seldom occur along the large water-courses. The regular period when rain may be expected is during November and December, sometimes in January, February, or March, and again in June or July and August, but rains are irregular and may occur in any month of the year. Snow falls frequently while the cold weather lasts, but often merges into rain-storms, and seldom lies on the valleys long enough to inconvenience stock.

Cattle appear to have held the ascendency in Mohave and Yavapai counties from the time of their introduction, about 1864, but sheep bid fair to outnumber them. It was not until 1875 that the free ranging of stock was possible and became general, but since that date the increase of herds and flocks by natural growth and from outside sources has steadily gone on, until, in 1880, these counties have become in a general sense fully stocked, so far as existing water resources permit.

The largest herd of cattle, one running in Big Chino valley, was reckoned at 3,300 head. One flockmaster located at Chavey pass, in the Mogollon mountains, owns 7,000 sheep, said to be the largest number held by any one person west of the county line.

When the region of the San Francisco and Mogollon mountains was thrown open by a temporary adjustment of Indian difficulties, it looked as if there was ample room for the progress of the local husbandries, but the California and Utah drives, with re-enforcements from New Mexico, rapidly absorbed the unfed pastures. While the good portion has been almost completely occupied by cattle and sheep, there are still large tracts of grassed mesa and valley land in the north along the face of the Great Plateau, and through the arid portions south of the Colorado in Mohave and Yavapai, only partially occupied.

A common complaint was heard in Yavapai county that sheep from the neighboring county, Apache, were damaging the pasturage without contributing to the taxes. Mormon flock-owners, it was asserted, annually grazed their sheep from the winter ranges along the valley of the little Colorado up into the foot-hills and main area of the Mogollon, where they passed the hot weather unrecorded by the assessor of either county.

The various local markets at towns, mining camps, army posts, and Indian agencies have always taken the beef of the northwest, though mutton has accumulated within a few years beyond the demand; but in 1880 the export showed that the pastures were well occupied. Several cattle herds went into the southeast corner of the territory, and one beef herd crossed the Mohave desert to the railroad at Mohave station, Kern county, California. If a hill or mountain ground can be reached, the lowland can be recruited for winter occupation, and in this way the two ranges used alternately and with moderation may supply for years the needs of the herdsmen. But under the system of using the same range continuously the pasturage is sure to decrease, and, according to the testimony of resident settlers, such has been the case in many valleys of Yavapai and Mohave.

PRICES.—The following estimates of values are compiled from numerous answers, showing valuation of stock on ranges as placed by the owners, and, although necessarily vague and loose, nevertheless give the best available estimate of the assumed value of the various kinds of stock here indicated in their several localities. American herds were held at a somewhat high price for a region so distant from dense population. The few breeding herds of good native blood ranged in this section were seldom for sale, but estimates placed their value "all round" at $16 to $18, exclusive of beeves. The improved Texan and Mexican cattle sold at $11 50 to $12 50 per head by the herd, a slightly advanced valuation over 1879. These isolated ranges were undoubtedly influenced by the prospect of the rapid development of Arizona mining schemes and railroad enterprise, as well as by the appreciation of stock in outside markets. The custom prevails of slaughtering beef-cattle at two years past by the small retail butchers, who hesitate to kill heavy beeves for their limited trade. As a result of this, the majority of the beef turned off is under three and a half years old; and it was confidently stated that it would be impossible to "round up" 1,000 old steers from the 51,000 cattle ranging in the two northwestern counties.

Beef sells in Prescott at an average of 4½ cents per pound net, varying with the time of year, rising especially during winter and early spring, when range animals are in poorest condition and the market therefore less easily supplied.

MANAGEMENT.—The location of the water supply, which limits grazing, keeps stock at home and easily "worked", and limits the size of herds, compared with those bred in regions more favorably watered.

The first general handling by cattle-owners is in the last of May or early June, when a rounding up of the range animals of a certain stock section is effected by from five to thirty men, as the size of the range may require. At this time the young calves are branded, ear-marked, and, if males, castrated, having been "cut out" from the main bunch with their mothers and driven to a convenient branding-pen. The cattle are again handled in September or October, when late calves are attended to. The certainty of catching stock near water, and the limited extent of water on most ranges, necessitates the employment of but few hands; moreover, the isolation of the herds, that rarely mingle to any extent, accounts for the unimportant dimensions of the "round up".

Good "cow horses" are worth from $40 to $50, and the services of only three or four are generally required by each vaquero, even of the most active crews. In this region of high prices the wages for riders range from $35 to $45 per month, and board about $18 per month.

Few cattle-owners fence hay land, although many of them cut a small tonnage of fodder on natural meadows for their work or saddle horses engaged during winter time. Such few inclosures as were made in 1880 were meadows or grain plots fenced in by the farmers, not often over 100 acres in area, and seldom utilized in connection with free-range grazing. The timber used was cedar and pine posts with yellow-pine boards principally; wire, from the cost of wagon transportation, being too expensive for such purposes. Considerable attention, however, was being given to a more extended plan of inclosing stock pastures, particularly for dairy herds and horse-breeding. The majority of the horses are turned out like cattle to graze on the range all the year round. No particular attention is given during the cold weather to range herds, except when contracts to supply markets oblige cattlemen to bring in beef-cattle at any time they may be required. A general surveillance of the business is, however, kept up by riding two or three times a week on the outskirts of the range, and it may be said that an Arizona herder knows much better where his limited stock grazes than those of the Wyoming and Colorado plains.

GOATS.—About 2,000 goats were held in Yavapai county at the time of this investigation, the majority of them graded Angora, that is, once crossed with Angora blood.

The country is deemed better for sheep than for cattle, it being more practicable to herd sheep than range cattle in a region sparsely watered. The no-fence law in some parts of farming valleys is also affecting the free holding of neat cattle. But few flocks have attained a size of over 5,000 head, the largest reaching about 7,000 in 1880. Small flocks of from 1,000 to 3,000 are the prevailing sizes. From the fact that many ranchmen held both cattle and sheep, and because the latter stock could avail themselves of many locations where handling the former was less profitable, the two husbandries have not come seriously in conflict.

TAXATION OF LIVE-STOCK IN YAVAPAI COUNTY.—The assessment valuations placed on cattle, sheep, and swine are as follows:

Work oxen	$15 00 to $20 00
Milch cattle	12 00 to 13 00
Stock cattle	9 00 to 11 00
Graded sheep	1 50
Mexican and half-breeds	75 to 1 00
Goats (Angora)	1 50
Goats (Mexican)	75
Swine	5 00

The rate of taxation was $4 on the $100 valuation during 1879; but during 1880 it was reduced to $3 50.

LOSSES AMONG CATTLE.

Although difficult to average, it may be said that the estimated annual loss from various causes among cattle in Arizona, according to the testimony of stockmen, was as follows: Loss from disease, 1 per cent.; from storms of winter and spring, 1 to 2 per cent.; from wild animals, 1 to 2 per cent.; from poisonous weeds, 1 to 5 per cent.; and from theft, 3 to 5 per cent.; the total annual loss averaging from 7½ per cent. in northern Arizona to 10 per cent. in southeastern Arizona. Blackleg, often reported in the herds of the west, was reported in Arizona in 1879 and 1880 as first appearing in the autumn of 1879, carrying off 10 per cent. of fat calves and yearlings. In the spring of 1880 over 250 young cattle and 150 horses are reported to have perished in Tonto basin; some claiming, however, that this mortality was occasioned by some unknown poisonous weed rather than by disease. In the winter of 1880–'81, distemper was reported in the herds of Yavapai county, causing heavy losses in young stock. It is hard to estimate the loss by theft, which varies from entire exemption in small herds to very serious loss in other cases. Other fatalities are by poisoning from alkali or weeds, and occasionally from the bite of the rattlesnake. Big jaw was remarked in several instances while passing through the ranges of Yavapai. In general this portion of the territory may be called eminently healthful.

WEIGHT OF BEEVES.

The estimated live and dressed weight of four-and-a-half-year-old beeves of Arizona is as follows: Spanish or Mexican beef, live weight from 685 to 735 pounds, dressed weight from 350 to 375 pounds; improved Spanish beeves, live weight from 825 to 875 pounds, dressed weight from 425 to 450 pounds; Texas beeves, live weight

from 880 to 930 pounds, dressed weight 450 to 475 pounds; improved Texas, 975 to 1,070 pounds live weight, dressed weight 500 to 550 pounds. Native American beeves, live weight from 1,155 to 1,200 pounds, dressed weight 600 to 625 pounds.

SHEEP.

In 1868 sheep came in from California by way of Mohave desert. Mr. James Baker, the pioneer, lost in these drives nearly the whole flock by Indian raids, which continued until 1875 to make sheep-raising very hazardous.

The few sheep that came into Yavapai county previous to 1874 were mostly small flocks from California or mutton-sheep from New Mexico. During 1874 and 1875 a considerable movement of stock sheep occurred from New Mexico, and in 1876 several drivers, taking stock from the drought-affected ranges of California to New Mexico, were induced to sell or locate their sheep in Yavapai county. The drive from the west went on with decreasing numbers until 1879.

The Mormons for four years past have driven breeding flocks accompanying their emigration to Arizona, the grade of sheep being inferior to that of the western flocks. These people have settled mostly on the little Colorado, but a number of their ranches have been established in Yavapai county. Thus Yavapai county (which holds all the sheep of the northwest section of Arizona) was stocked mainly with a good sort of animal, the well graded Spanish and French merinos, though inferior breeds also appeared from New Mexico and Utah. The improvement has been steady, and at present, except old breeding ewes, there are few flocks of the New Mexican sheep in the county. Many proprietors produce wool ranked in the market as "heavy fine merino", but the bulk of the product is "heavy medium merino". Its quality is good, but dirty, from the occurrence of sand-storms on the mesas.

A majority of the flocks are sheared twice a year, and the average yield of wool among flocks of California origin is from 6 to 6½ pounds; the inferior shear of other flocks would probably reduce the average figure very considerably.

In the management of sheep the practices of southern California govern many breeders, though others cling to the old-time methods of Utah and New Mexico. But few instances of dipping for scab were reported, the custom prevailing of "handling" sheep thus troubled or using ointments in the affected parts. Colonel Head, a large buyer of Yavapai fleeces, asserted that scab seemed well under control and did not occasion any considerable loss of wool.

As a rule, the wool from flocks east of the Mogollon mountains goes to the Atlantic cities direct, and that west of this barrier to San Francisco. Although the local markets have annually called for a considerable amount of mutton-sheep, the competition of trail drivers and Apache county owners, who bring in cheap New Mexican wethers, has made the price so low that the Yavapai breeder has found it more profitable to retain his fat sheep for their wool. Of necessity the estimates must be somewhat loose and indefinite. The following are from the best attainable authorities and are given for what they are worth, without claim to exactness:

ESTIMATED VALUE, WEIGHT, AND WOOL-CLIP OF ARIZONA SHEEP.

Breed.	STOCK SHEEP.				THREE-YEAR-OLD MUTTON-SHEEP.		AVERAGE ANNUAL WOOL-CLIP.			
	Rams.	Ewes.	Wethers.	Lambs.	Live weight.	Value as mutton in Arizona.	Rams.	Ewes.	Wethers.	Lambs.
					Pounds.		*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Mexican sheep	$2 50 to $2 75	$1 00 to $1 25	$1 25 to $1 50	$0 50 to $0 75	65 to 70	$1 50 to $1 75	3.00 to 3.75	1.75 to 2.00	2.25 to 2.50	1.00 to 1.25
Half-breed Mexican sheep from Mexican ewes and graded merino rams.	4 00 to 5 00	1 50 to 1 75	1 50 to 1 75	1 00 to 1 25	80 to 85	2 25 to 2 50	5.50 to 6.50	3.00 to 3.25	4.00 to 4.75	2.00 to 2.25
California grade merinos	20 00 to 40 00	2 25 to 2 75	2 50 to 2 75	1 50 to 2 00	90 to 95	2 50 to 3 00	12.00 to 15.00	6.00 to 6.50	7.00 to 7.50	4.50 to 5.00

LAND TITLES.

The majority of the cattle and sheep owners throughout Arizona hold their ranches merely by a possessory title, or by the right of first occupation. The law of the territory secures to the ranchmen a claim established by earliest settlement, or by the purchase of such right from a previous first occupant. Moreover, it allows him the precedence in filing on such property under the United States land laws, when the locality is surveyed, a process that has as yet opened but few townships in Arizona to homestead or pre-emption rights. To get or maintain a possessory title to land about water (the chief consideration, as water must be had to make pasture available) any stockman having discovered or bought from some other early locator a water claim drives thither his cattle or sheep and locates. So long as he makes use of the claim his right of possession is assured; but it may be lost by even the temporary absence of the owner and stock from the locality, when some crafty observer may "jump" the claim and usurp the possession. Among the ranchmen a tacit recognition of first rights generally exists, so that men retain command of water privileges with as much surety as of other property.

MOVEMENT OF CATTLE AND SHEEP, 1880.

	FROM ARIZONA.				TO ARIZONA.			
	Destination.	Cattle.	Sheep.		Source.	Cattle.	Sheep.	Swine.
	Total	1,600	10,000		Total	*37,100	79,250	1,000
By drives	To California for beef from Mohave county.	300	.....	By drives	From Montana territory	.....	†32,000	.....
By drives	To New Mexico	1,000	10,000	By drives	From Utah territory	3,000	15,000	.....
By railroad	To California for beef from Pima county.	300	.....	By drives	From California	1,500	.....	.....
				By drives	From Mexico	8,000	2,000	.....
				By drives	From New Mexico territory	15,000	30,000	.....
				By drives	From Texas	7,500	.....	.....
				By drives	From Colorado	2,000	.....	.....
				By railroad	From California	100	250	‡1,000

* About 12,000 head of these cattle were driven into Arizona to fill government contracts at military posts and Indian agencies.

† These sheep were driven first from northern California to Montana. Dissatisfied with the experience of two winters in that territory, their owners moved their stock to Arizona in 1880.

‡ These swine were brought in to supply the Chinese laborers employed by the Central Pacific railroad in construction of that road.

CATTLE, SHEEP, AND SWINE IN ARIZONA TERRITORY AS REPORTED FOR CERTAIN YEARS.

Year.	Authority.	Cattle.	Sheep.*	Swine.
1856	W. S. Oury, esq., and other old residents of Tucson	200	250	150
1870	Ninth Census (on farms)	5,182	803	720
1880	Tenth Census (on farms)	44,983	76,524	3,819
1880	Tenth Census (on farms and estimated unenumerated ranch and range stock)	135,757	466,524	8,449

ESTIMATED NUMBER OF CATTLE, SHEEP, AND SWINE IN ARIZONA TERRITORY JULY 1, 1880.

Sections.	Sections defined.	APPROXIMATE ACREAGE OF STOCK OCCUPATION.		STOCK.		
		Cattle.	Sheep.	Cattle.	Sheep.*	Swine.
	Total	28,000,000	11,500,000	135,757	466,524	8,449
Northwestern	Mohave and Yavapai counties	11,000,000	2,000,000	51,272	38,707	1,177
Northeastern	Apache county	8,000,000	8,000,000	35,955	375,816	2,413
Southern	Yuma, Maricopa, Pinal, and Pima counties	9,000,000	1,500,000	48,530	52,001	4,859

* See note to Texas tables, p. 31. Indian stock is included in above.

Total land area of territory	acres..	72,268,800
Total area of approximate available pasturage	do...	40,000,000
Total area of unoccupied available pasturage	do...	12,000,000
Total population		40,440

AVERAGE DENSITY OF STOCK (CATTLE AND SHEEP) OCCUPATION.—Making one head of neat stock the unit of stock, and considering five sheep to equal one head of cattle in relation to consumption of pasture, we have 229,062 units of stock occupying 28,000,000 acres, or 122.24 acres to the head.

For convenience the stock of the Navajo Indians, partly in Arizona and partly in New Mexico, is included in New Mexico.